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A Heavy Forging Plant in Wisconsin



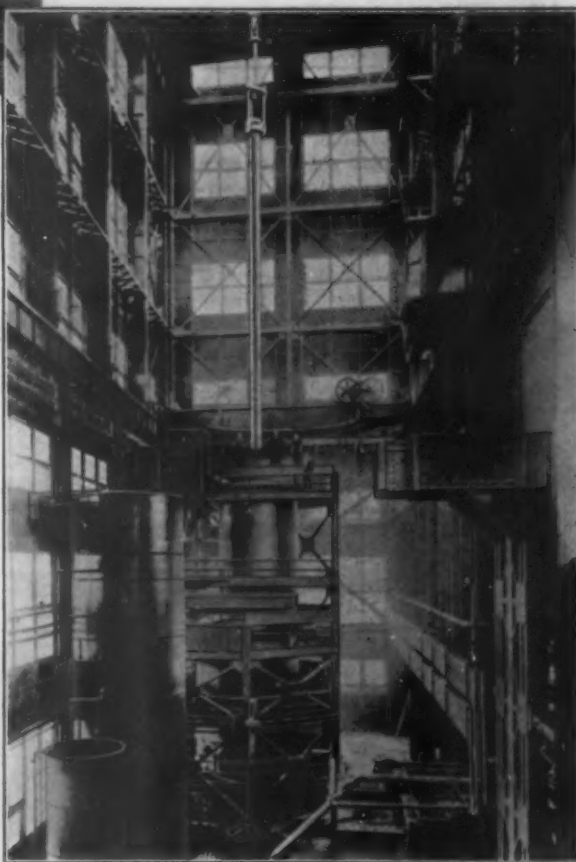
By Developing for Its Own and Government's Needs, Allis-Chalmers Co. Has Facilities Comparable With Best in East

MANY industrial institutions which materially enlarged their facilities to help win the war now find themselves equipped for increased peacetime business. Among the plants which expanded to meet the emergency needs of the Government was the forge shop at the West Allis, Wis., plant of the Allis-Chalmers Mfg. Co. This company first engaged in the production of its own forgings about 12 years ago when the development of its large units for steam, electric and hydraulic plants brought it face to face with the alternative of buying in the East, or even from Krupp's, to secure the large forgings required, or expending a large sum for the construction of its own forge shop. In view of the delay and inconvenience which it would have experienced had it elected to purchase its forgings from distant plants, the management decided on the latter course.

At the time war was declared, the company's forge shop was approximately 160 x 446 ft. and was equipped with a 3000-ton hydraulic press, a 6-ton, a 3-ton and a number of smaller steam hammers. When it became apparent that this country would become involved in the European war, a 100 x 346-ft. addition was erected to provide space for the installation of a 1000-ton hydraulic press and horizontal heating furnaces, and the roof was raised several stories at one end of the plant to permit the construction of two large vertical furnaces. For a period of 14 months prior to the armistice, the plant was operated 24 hours a day. The forgings it produced included guns and tubes, torpedo cylinders, recoil cylinders and pistons for the largest navy guns, shafting for battleships, cruisers and destroyers, as well as shafting, connecting rods, rudder stocks, etc., which it furnished the Emergency Fleet Corporation.

The 3000-ton hydraulic press, shown in one of the accompanying illustrations, is located in the older section of the plant. It is a Niles-Bement-Pond machine equipped with a United Engineering & Foundry Co. steam intensifier. In the same aisle are located a 6-ton steam hammer, a 3-ton hammer, two 3500-lb. hammers and a number of smaller ones.

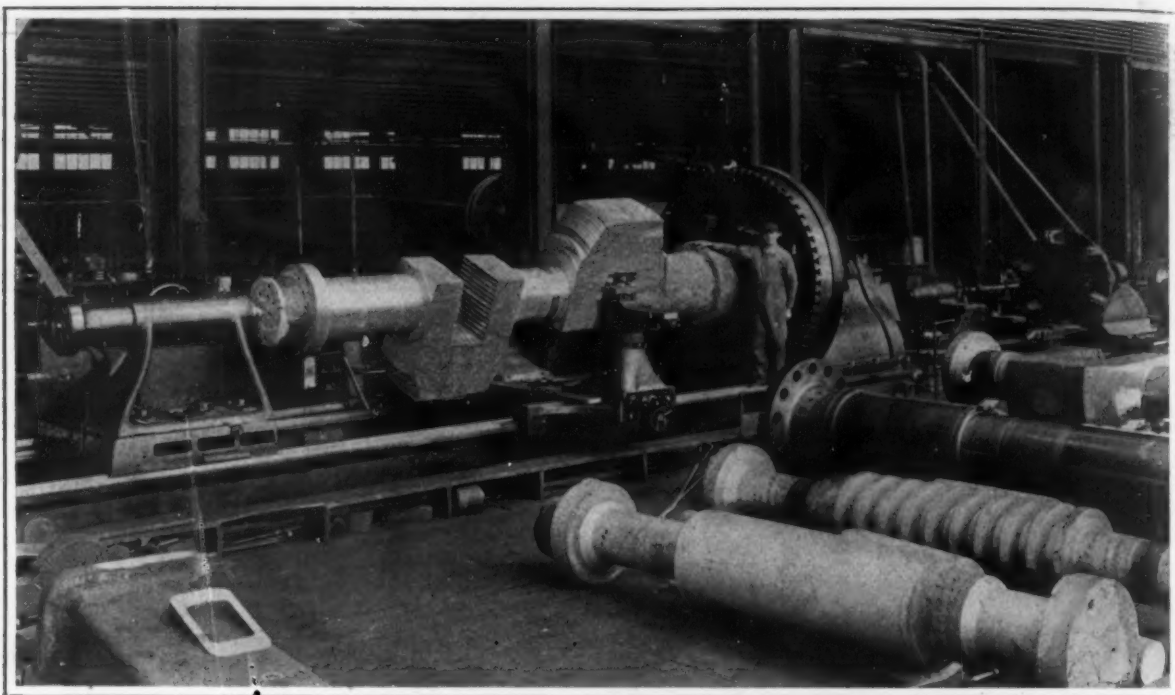
A 1000-ton United Engineering & Foundry Co. hydraulic press of the steam intensifier type is situated in the newer section of the shop. When it was decided to install this machine, it was found that the manufacturer would be unable to deliver for months on account of previous commitments. This obstacle was overcome by the Allis-Chalmers company by securing the loan of the designs. Within a period of 45 days the company



Interior of Vertical Heat-Treating Department, Which Is Housed in the Seven-Story Building. The suspended shaft hangs above a vertical furnace 70-ft. deep. A 50-ft. furnace is located between the larger furnace and an 80-ft. quenching tank shown in the left of the illustration. Both furnaces are set 25 ft. in the ground, while the tank extends 37 ft. below the floor level.

made the patterns from the drawings, poured the castings, did the necessary machine work and erected the press. Within 60 days the press was in operation, the entire machine with the exception of the valve mechanisms, having been manufactured in the West Allis plant. For 14 months thereafter the press was operated night and day on Government work.

For heat-treating purposes the plant is equipped with three car-type box furnaces, 8 x 12 x 16 ft.; two car-type furnaces, 6 x 8 x 30 ft.; two car-type furnaces, 6 x 8 x 45 ft.; one car-type furnace, 6 x 8 x 50 ft.; one open-top furnace, 5 x 7 x 16 ft.; one open-top furnace, 6 x 8 x 50 ft., and many other furnaces of smaller dimensions. All of these horizontal furnaces are of the semi-muffle car type, i.e., containing interior baffle walls which deflect the flames from the oil burners so that



Turning a Two-Throw Crankshaft Forged in the Allis-Chalmers Shop

they pass above the steel being treated. At 3-ft. intervals along the furnace walls are sockets for the insertion of burners or thermocouples, both of which are stag-

gered, a burner being opposite a thermocouple in the other wall. This arrangement is followed to make for an even distribution of heat. The thermocouples are connected to Leeds & Northrup pyrometers in a pyrometer house where temperature readings are recorded every 30 seconds. The pyrometer room is also equipped with a potentiometer, from which a magnified reading can be taken at any moment. Through these indicators the temperatures at the various furnaces are continually under observation.

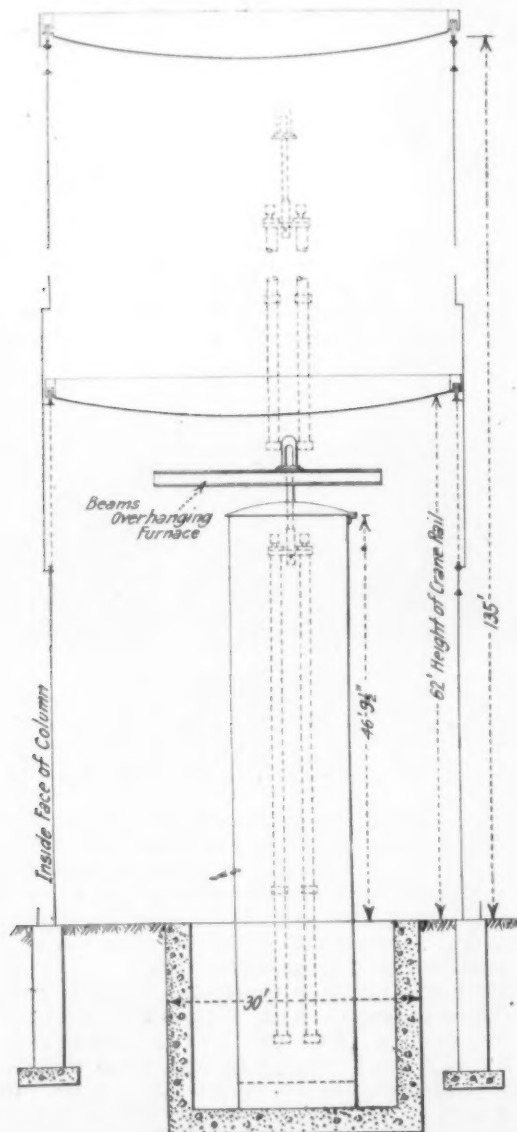
Between the tracks leading into the two 45-ft. furnaces is a horizontal quenching tank which is 45 ft. in length.

The most interesting section of the forge shop from the point of view of design and equipment is the vertical furnace department, which is located in the west end of the older portion of the plant. Here the roof was raised several stories to provide room for handling forgings upon their insertion and withdrawal from the furnaces. This department was provided for the heat treatment of hollow shafts, and contains two large semi-muffle cylinder vertical furnaces, one of which is 14 ft. in diameter by 70 ft. deep, for treating shafts up to 60 ft. long, and the other 14 ft. in diameter by 50 ft. in depth. Both furnaces are set 25 ft. in the ground so that they project 45 ft. and 25 ft., respectively, above the floor level.

The furnaces are surrounded by a structural steel scaffold, which carries the working galleries and supports the various auxiliary facilities required for the operation of the furnaces. This framework is tied to the steel work of the west wall of the plant.

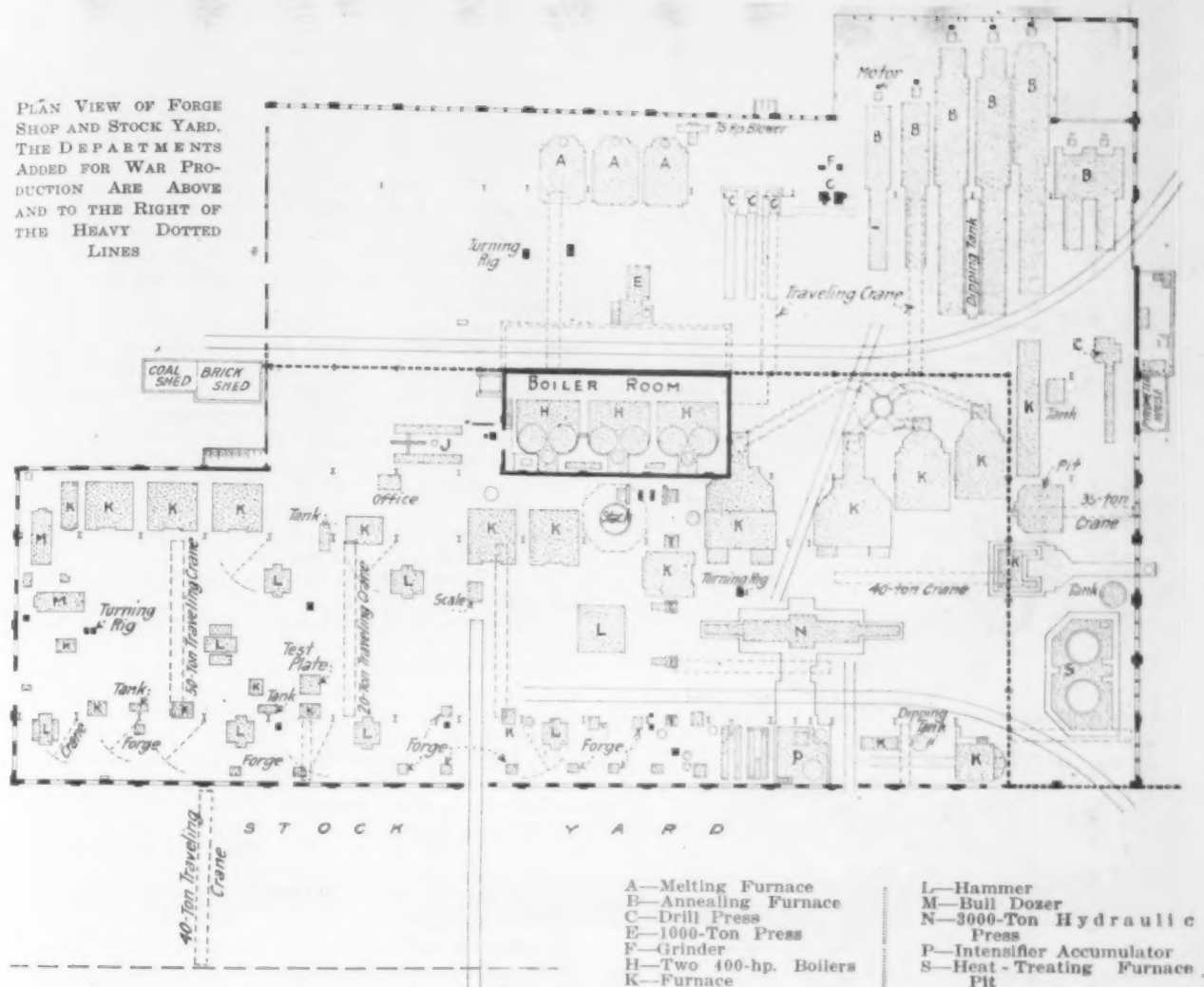
The furnaces are enclosed in steel shells, lined with brick 18 in. thick. On the inside of the brick insulating wall is a brick baffle wall $4\frac{1}{2}$ in. thick. The chamber is 8 ft. 4 in. in diameter within the baffle wall. Between the latter and the insulating wall is a $4\frac{1}{2}$ -in. annular space for the circulation of the heat before it passes through numerous apertures in the baffle wall into the interior of the furnace. The illustration showing a horizontal cross-section of one of the furnaces indicates the location of the thermocouples and the oil burners. It will be noted that the burner inlets are set on a tangent so that the heat will strike the baffle wall at an angle and circulate around the furnace, thereby insuring an even temperature. To the same end the holes in the baffle wall are arranged so that they will not receive the full force of the heat as it enters from the burners, the wall at these points being solid.

The vertical cross-section of one-half of the smaller furnace gives another view of the burner inlets, locates the observation holes of which there are four on each



The Larger Furnace, Showing Two Shafts Before and After Insertion in the Heating Chamber

PLAN VIEW OF FORGE SHOP AND STOCK YARD. THE DEPARTMENTS ADDED FOR WAR PRODUCTION ARE ABOVE AND TO THE RIGHT OF THE HEAVY DOTTED LINES

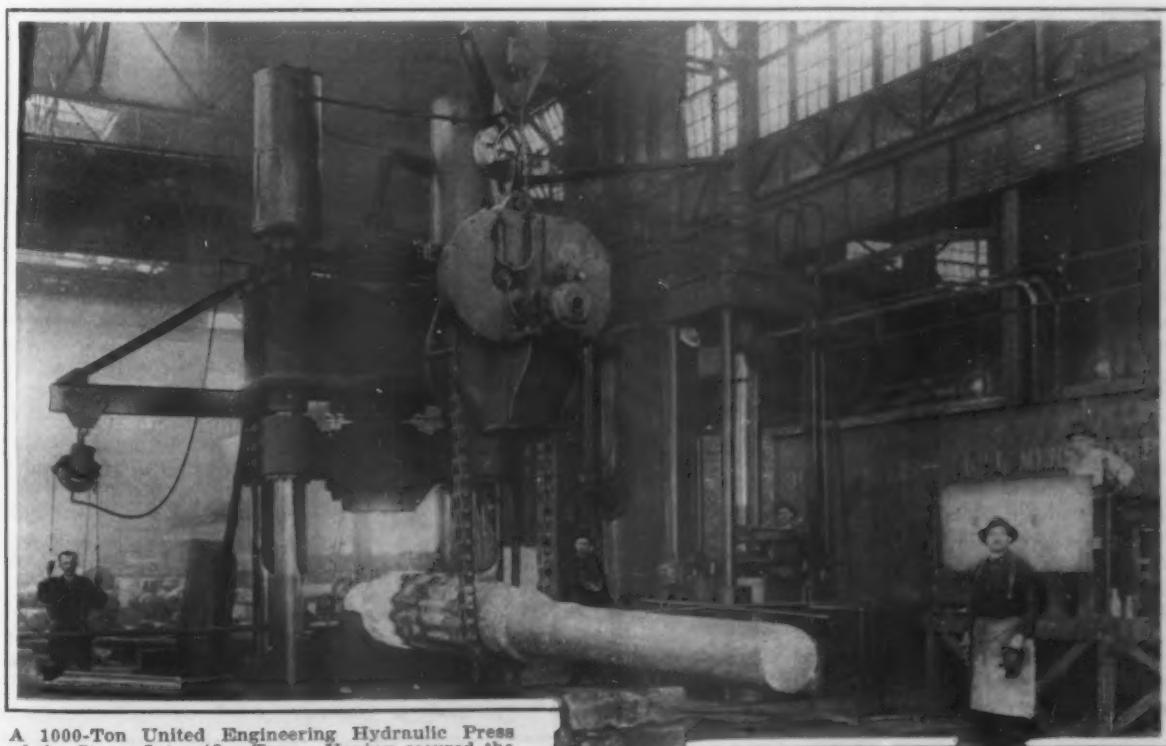


gallery, and shows the numerous openings in the baffle wall.

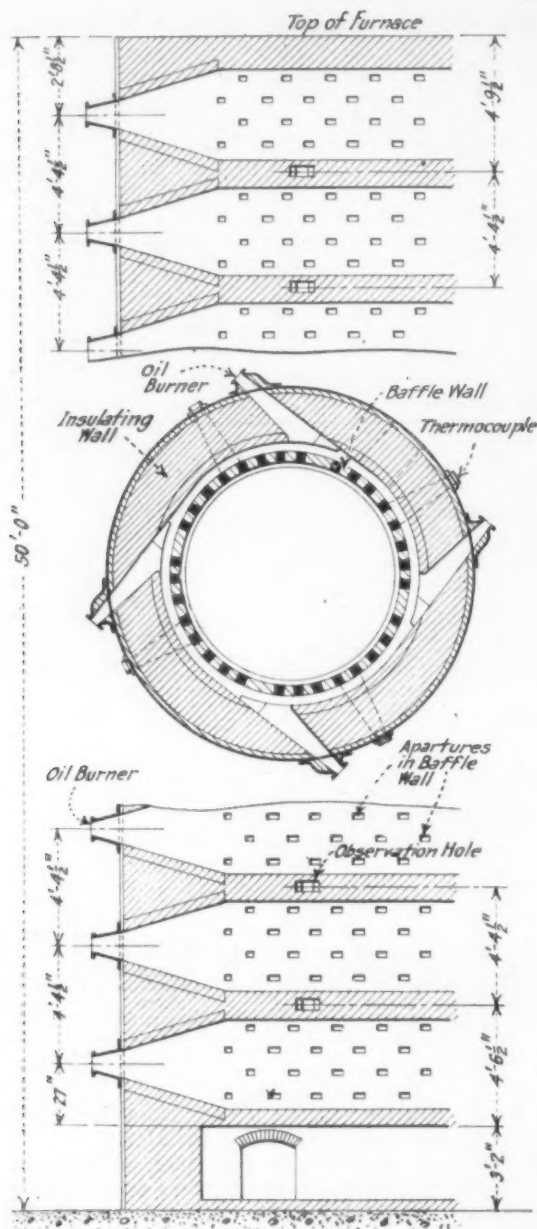
There are two sets of four burners, or eight in all, on each gallery level, there being nine gallery levels in the case of the larger furnace. At the top of the fur-

naces hand operative beams open and close the covering doors, which are lined with brick 3 ft. thick.

Shafts to be heat-treated are fitted in crabs on a shaft loading platform, of which there are two in the department. Suspended from the crab, the shaft is



A 1000-Ton United Engineering Hydraulic Press of the Steam Intensifier Type. Having secured the loan of the design, the Allis-Chalmers Co. built and erected the press within 45 days



Vertical Cross-Section of One-Half of Smaller Up-right Furnace and a Horizontal Cross-Section. The tangential openings in the walls of the furnace admit the heat from the oil burners. The observation holes and the thermocouples are set radially from the interior of the furnace.

lifted by a 50-ton Alliance crane and then lowered into the furnace, flanges on the crab resting upon the beams which extend across the doors. The crane serving the furnaces is 135 ft. above the floor level and has a lowering speed of 175 ft. per min., insuring the expeditious handling of material to be treated. The crane is under remote control, being operated from an enclosed observation box, which may be seen in the illustration of the vertical furnace department on the right-hand wall just above the lower crane. Here the operator has an excellent view of the furnaces and the quenching tanks. He is not, however, dependent upon his eyesight to control the movement of pieces to be heat-treated. Through the simultaneous flash of a pair of lights for each furnace and the large tank, he is advised when the shaft is suspended directly above the furnace or tank in which it is to be inserted.

To facilitate intra-shop communication telephones connect the observation box with the floor and with the platform joining the top of the larger furnace with that of the larger quenching tank. The high crane is also equipped with a telephone so that repair men may call for necessary tools without leaving their work.

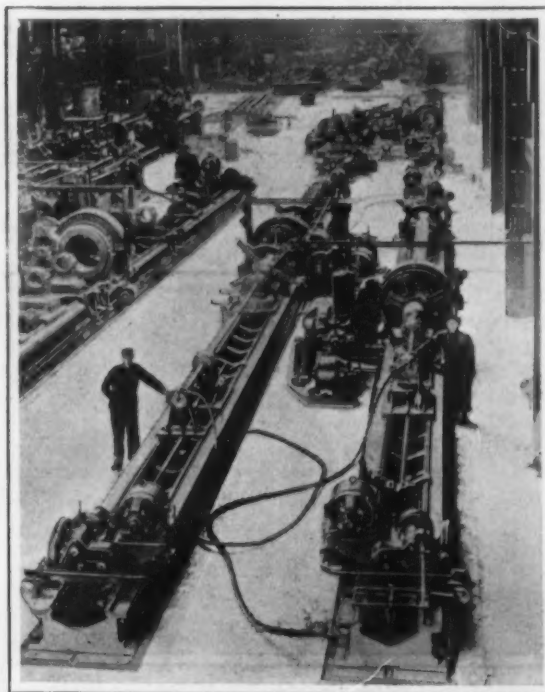
An automatic electric elevator serves the furnaces and the quenching tank. This insures the attendants quick access to all parts of the furnaces and tank, both above and below the floor level. Each furnace is pro-

vided with a main shut-off on the fifth gallery level, which is just above the floor. This enables the operators to extinguish the burners promptly in case of emergency.

The larger quenching tank, which is used in conjunction with the furnaces, is 14 ft. in diameter by 80 ft. in depth, extending 37 ft. below the floor level. Water inlets are situated at equidistant points up the side of the tank. The water, as it enters, is deflected by shields which cause it to assume a circular motion in the interior of the tank. This arrangement makes for a more uniform temperature than would be otherwise possible. The control valves for all of the inlet pipes are located on the floor level.

To the north of the forge shop is the stock yard, where materials are arranged according to size, the smaller sizes being placed towards the end of the plant where light forging is done, while the larger sizes, including billets up to 24-in. square and ingots up to 62 in. in diameter, are piled adjacent to the section of the shop where the hydraulic press and the heavier steam hammers are located. The yard is 66 ft. wide and 446 ft. long, running the length of the older portion of the forge shop. For handling material within the yard a 40-ton Niles-Bement-Pond crane has been provided. Three railroad tracks connect the yard with the shop.

The company maintains a unique record system to keep track of its raw material. As soon as new stock arrives, it is painted with its heat number, which is also entered in a journal in one of a number of columns designating the character of the steel—whether it be low, medium or high carbon material, or a special steel alloy, such as nickel, chrome, vanadium, or chrome vanadium steel. The heat number also serves as a page number for a detailed record of the material, a sample of which is reproduced. These record sheets give the name of the manufacturer furnishing the material, indicate the grade of the ingot or billet, its size and weight, the date of receipt, the car number and initials, and the number of the bill of lading. Space is also provided for entering the results of the manufacturer's chemical and physical tests, as well as the chemical test of the forge shop, if such a test is made. On the same sheet a record is kept of all forgings from the material, in the order in which they are made. Here are entered a brief description of the work, the name of the company ordering the forging and various other details, such as the order number which the shop has assigned to the work, the test bar number, the maximum dimensions, the weight, date of forging and the capacity of the press or hammer used. Detailed information regarding



View in Machine Shop Serving Forge Plant, Showing Lathes Used for Boring and Turning Large Forgings

ALLEN CHALMERS MANUFACTURING COMPANY
FURNACE, STEEL, IRON, BRASS, COPPER

Heat No. **41043**

RECORD OF *Nickel Ingot* FURNISHED BY *XYZ Co.*

SIZE	Wt.	Heat No.	Grade	Spec.	Chem.	Weight	Remarks
56 in. 1	---	17245	2-3-19	P.A.R.	534335	93380	14236

MANUFACTURER'S TEST

Carbon	Phosph.	Sulph.	Manganese	Silicon	Iron	Chromium	Nickel	Vanadium	Other
0.34	0.00	0.02	0.1	0.1	3.16				

PHYSICAL TEST

Specimen	Temp.	Stress	Elongation	Red. of Area	Temp.	Stress	Elongation	Red. of Area

CHEMICAL TEST

Specimen	Temp.	Stress	Elongation	Red. of Area	Temp.	Stress	Elongation	Red. of Area

FORGEING

Specimen	Temp.	Stress	Elongation	Red. of Area	Temp.	Stress	Elongation	Red. of Area
25-1504	1237	458	2.0%	52-4	66000	3240	30000	

HEAT TREATMENT

Specimen	Temp.	Stress	Elongation	Red. of Area	Temp.	Stress	Elongation	Red. of Area
41100	50800	91650	24.5	40				
41101	50050	90850	25	45				
41102	50450	91500	25.5	41				
41103	50500	92400	26	45				
41104	50450	90700	24.5	45				

Accepted

A Sample Forge Department Record Sheet. Here are entered important facts regarding the character of the raw material and data concerning the forgings made therefrom

the time and manner of heat-treating and the results of the physical tests made thereafter are also registered.

This scheme of accounting gives the forge shop a complete check on the results achieved with all the materials it uses. If an ingot or billet does not run uniform, it soon becomes apparent and an inquiry can be directed to the manufacturer to ascertain the source of the trouble. By showing the weight of each piece of work, the record of forgings taken from a given ingot indicates the amount of material not yet utilized.

In handling stock the company keeps an equally careful record, under which no piece of material, no matter how small, ever loses its identity. As soon as an unused portion of a billet or ingot is cut off a forging,

its weight, the heat number, the size of the original billet, and the most important chemical characteristics are painted thereon by an employee assigned solely to that duty. For instance, the characters "tr. van. 56" 680 lb. C 33 H 3640" indicate that the heat number of the material is 3640, that it contains 0.33 per cent carbon and a trace of vanadium, weighs 680 lb. and was taken from what was originally a 56-in. ingot.

So carefully has this method been followed that the loss of material has been reduced to a minimum. In handling 98,000,000 lb. of forgings in the forge shop, the loss in stock was less than 0.1 per cent.

As a check on its own work, the company stamps each finished forging with its order number, test number and heat number.

Chicago and Meriden, Conn., Plants Taken Over

The Ayer-Kempton Corporation, capitalized for \$700,000, has been organized to take over the business and plants of the Ayer-O'Connell Co., Meriden, Conn., and the Bennett-O'Connell Co., Chicago, manufacturers of polishing wheels. The Ayer-Kempton Corporation recently acquired the Pfeiglar Hardware Specialty Co., New Haven, Conn., which manufactures a line similar to its own. The merger of the three companies becomes operative Jan. 1 next. The Ayer-O'Connell Co. operates a factory and storehouse in Meriden, and the Bennett-O'Connell Co. a three-story factory in Chicago. These plants were taken over on a \$450,000 net basis.

Steel Heat-Treatment Chart

A heat-treatment chart which embodies in compact form the factors that are ordinarily involved in the heat treatment of steel, is being distributed by W. S. Rockwell Co., 50 Church Street, New York. The chart gives Fahrenheit and Centigrade temperatures, with corresponding heat colors, tempering colors and the

list of tools to which they are ordinarily applied, and figures for carbon content with trade classifications of and uses for steel of corresponding carbon content. A critical range diagram covers temperatures as related to steels of various composition with regard to hardening and annealing conditions. Data on specific heats and melting points, conversion table of equivalents, heat equivalents, and a chart showing degrees in Centigrade, and equivalent degrees in Fahrenheit.

November Structural Contracts Less

The bridge and structural shops of the country took on contracts in November for 124,200 net tons of steel work, equivalent to 69 per cent of the full shop capacity, according to statistics of the Bridge Builders' and Structural Society, 30 Church Street, New York, compiled by its secretary, George E. Gifford. This is a slight recession from the average of about 78 per cent that has held for the previous three months or more. Should December business approximate that booked the past month, the average for this year will be about 50 per cent of capacity.

BOLT AND NUT MACHINERY

A New Line With Bearings Specially Bushed to Resist Wear

A line of machinery for hot forging bolts and cold punching nuts has been placed on the market by the Wm. H. Haskell Mfg. Co., Pawtucket, R. I. The general design is aimed to provide especially durability and economy of operation, and with this in view, bearings carrying heavy loads or those that are subject to severe stress are bushed with either babbitt, bronze, steel or cast iron.

For hot forging square, hexagon and a large variety of special heads on all sizes of stock up to and including $\frac{3}{4}$ -in. in diameter, a standard type machine is offered of a design providing a spread of 24 in. across the legs to afford an especially rigid support. The die-opening handle is 3 ft. 9 in. long, making the dies easy to open without recourse to the use of short pipe lengths or other expedients for extending the lever length to provide desired leverage. The balance wheel is bushed full length with hard bronze, all link connections are bushed with hardened steel, and the levers and cross-head are bushed with steel to eliminate the cost of boring out when making repairs. The operation is by continuous belt drive.

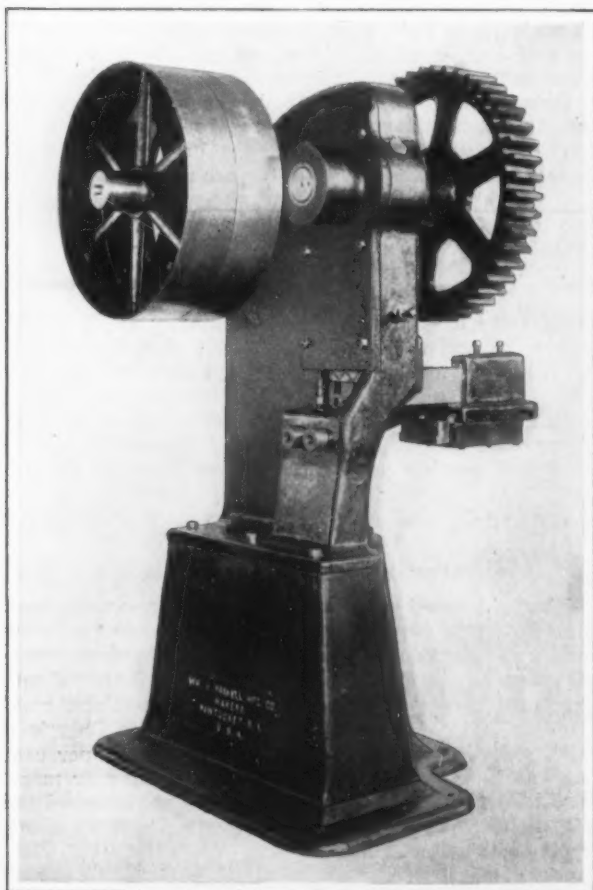
The No. 2 upright shear for cutting round bolt stock, studs, etc., with practically square ends, can be fed two $\frac{3}{4}$ -in. soft steel bars at a time through stationary tool-steel bushings. To prevent creeping under the thrust of the shearing an adjustable yielding gage is provided to insure the cutting of all pieces practically square across and exact to length. The machine is belt-driven by 26-in. tight and loose pulleys carrying 5-in. belt, the tight pulley acting as a balance wheel. The shear stroke is 2 in. Gearing is machine molded. The pinion is of gun iron and the ratio between gear and pinion is about 4 to 1. For safety the pinion gear is enclosed in a special cast-iron guard. An adjusting clutch allows the operator to rotate the gears one-quarter of a revolution to vary the tooth contact preventing uneven wear due to the impact of shearing. To avoid the necessity of upsetting the machine to

tighten the bolts holding the body to the base, the castings are designed so that the bolts are outside the standard. Both eccentric shaft and balance wheel shaft bearings are bushed.

Its No. 2 metal press for $\frac{3}{4}$ -in. standard square or hexagon nuts can be used for all kinds of punching within the capacity of the machine. It is clutch operated by foot treadle. The machine is driven by 26-in. tight and loose pulleys carrying a 5-in. belt. The drive shaft is extended beyond the pulleys to a floor stand support, eliminating uneven wear on the intermediate bearing due to the weight of the balance wheel. To further insure low power consumption the intermediate bearing is babbitted. All other bearings are cast-iron bushed even to the eccentric shaft bearings. The large gear is of gray iron and the pinion of gun iron, which, it is stated, gives 50 per cent greater strength than gray iron, both being machine molded. The gear ratio is $5\frac{1}{4}$ to 1 and the stroke is $1\frac{1}{4}$ in. The body casting is heavily ribbed inside for additional strength. In addition to the two die-block bolts four studs are employed for positioning the die-block. To prevent injury to the operator's hand by jamming between the front shaft bearing and the capstan for adjusting the plunger to permit insertion or removal of tools, the latter is made circular in shape.

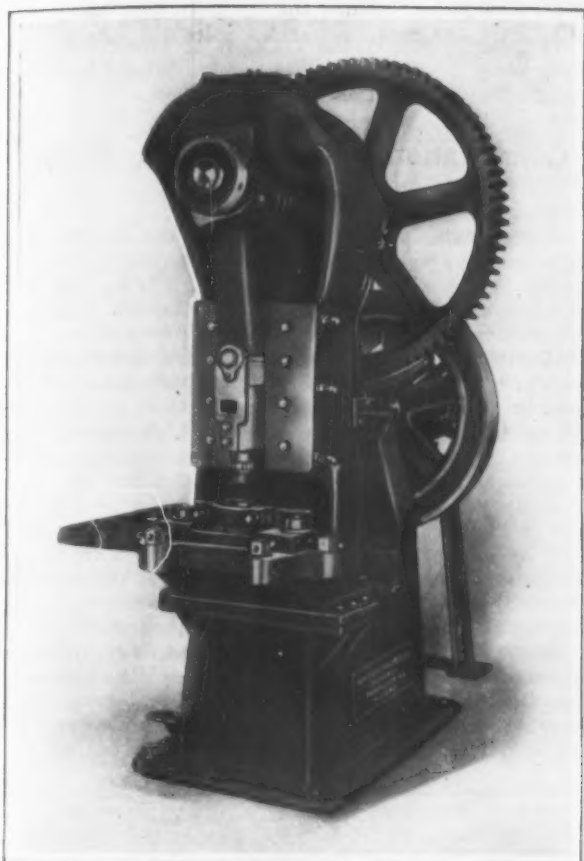
For trimming the flash from bolt heads and for bending parts, the company has designed a long stroke press with a 7-in. stroke. In place of an eccentric sliding box, it is equipped with an eccentric crank and pitman, with friction band on clutch block. Balance wheel shaft is supported on the end by floor stand.

The line also includes a 2-spindle horizontal type bolt milling machine, both the spindle and feed being driven from a three-step cone pulley. The driving shaft turns an 8-in. gear through two 4-in. pinions meshed with two 6-in. gears on the main spindles. The feed is by a worm and worm gear through another pair of gears to a rack and pinion, giving a carriage travel of 14 in. Bearings are cast-iron bushed throughout. The feeds are independent of each other and the duplex machines are customarily set up in pairs, one operator tending 4 spindles. As desired, hand feed may be substituted for power by employing the star wheel.



No. 2 Nut Press for $\frac{3}{4}$ -In. Standard Square or Hexagon Nuts, Also Adaptable for Various Other Punching Operations

No. 2 Duplex Upright Shear for Round Bolt Stock, Studs, Etc., Up to $\frac{3}{4}$ -In. in Diameter



Long Stroke Press Equipped with Eccentric Crank and Pitman Instead of Sliding Box

Automatic knockout for the feed stops the milling as the tool approaches the bolt head, the finishing of the head being done by the operator employing the star wheel.

Hindley Worm Gears

The origin, method of production and advantages of the Hindley type of worm gears were discussed by H. Fleckenstein, Hindley Gear Co., Philadelphia, at the recent convention of the American Gear Manufacturers' Association at Boston. This type of gear was designed by an English engineer, named Hindley, about 1857. The gears are cut from solid blanks, and are explained as being theoretically correct, as the cutters which produce the worm and wheel are rotated on their own axes and are positive driven. The gears are ground together after they are cut, thus to give good contact and smoothness of motion.

This type of gearing was pointed out as being particularly adaptable for valve motion drives, as they can be designed so that the wheel can be the driver and the worm the driven member. They have been used, Mr. Fleckenstein said, on special tire-making machinery, for mine hoists, gantry cranes, coal pulverizing machinery, horizontal boring mills, and other machine tools. Because this worm gear was found to stand up so well against the recoil of the guns, they were used by the United States Ordnance Department for elevating, traversing and sighting movements of guns. As an example of the load a Hindley wheel can carry, it was explained that the load due to the firing of a gun in one of the battleship turrets is 350,000 lb. This load is carried on the pitch line of a gear 25 in. in diameter.

The advantages of the Hindley type of gearing over the ordinary straight worm gear were explained by Mr. Fleckenstein as follows: They have a greater number of teeth in contact for a given pitch; they can be made with a greater depth of tooth; the teeth on the wheels have a straight side, which produces a flat bearing surface between the threads on the worm and the wheel teeth. On account of this, they have a greater bearing surface and slide together correctly. Therefore, there is only one action on the teeth of these gears, that is

a sliding contact at right angles or nearly so to the worm shaft, whereas the ordinary straight worm gears have practically two actions—a sliding contact at right angles to the worm shaft, and a rolling contact (the action of the teeth of the wheel, rolling in and out of the threads of the worm, similar to the contact of the teeth of two spur gears).

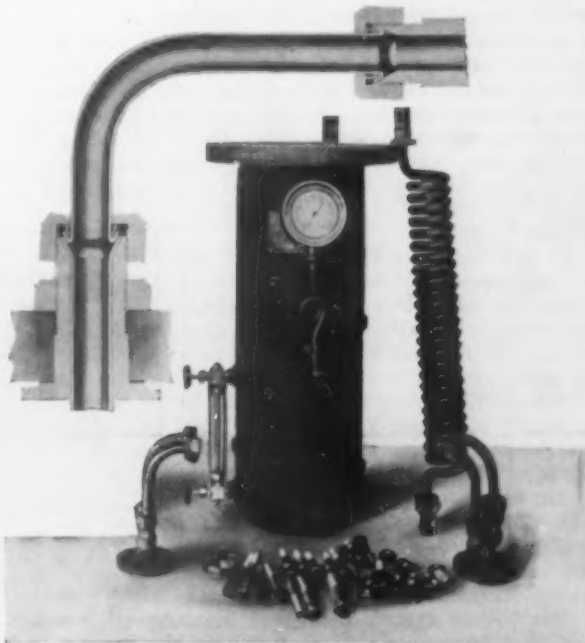
It was explained that on account of the greater bearing surface of the teeth a greater load can be carried on a Hindley worm wheel than on an ordinary straight worm gear of the same size. The given load is distributed over a greater bearing surface, thereby allowing the carrying of a greater pressure on the teeth, or if the same load is carried as on a straight worm gear, the bearing pressure is greatly reduced.

Hindley worm gears, it was stated, are especially adaptable for large reductions and high speeds. When run at slow speeds bearing pressures almost equal to the breaking strength of the metals can be carried.

Fuel Oil Heater for Power Plants

When fuel oil is burned under boilers it is necessary to preheat the oil before it goes to the furnace in order to insure proper vaporization and therefore good combustion of the fuel. A device for this purpose, known as the Reilly fuel oil heater, is stated by the manufacturer, the Griscom-Russell Co., 90 West Street, New York, to have been in use for a number of years in the United States Navy and merchant marine vessels. It is now being marketed for general use in stationary power plants.

The shell of the heater is of cast iron, said to be suitable for a working steam pressure of 250 lb. per sq. in. The oil is pumped through the coils of seamless drawn steel tubing, which constitute the heating



Oil Joints Inside of This Fuel Oil Heater Are Eliminated by a Special Construction Thus to Eliminate Contamination of the Condensed Steam by Oil Leaks

surface. The coils are helical in form and are interchangeable.

Inasmuch as high pressure steam is generally employed as the heating medium and as the condensation from this steam is returned to the boilers, it is necessary that the construction of the heater be such that there is no danger of contamination of this condensed steam by oil leaks, for this would mean that oil would be carried into the boiler. It is explained that the heater is built so that there are no oil joints inside, due to the use of a patented oil heater joint, shown in the accompanying illustration.

In 1918 Brazil exported 393,388 tons of manganese ore. For the first time in five years the shipments showed a decrease.

ACCIDENTS DECLINE

Statistics as to the Steel Industry Before and During the War

WASHINGTON, Dec. 22.—The Bureau of Labor Statistics has completed a new study of the accident rates in the iron and steel industry, based particularly on a comparison of the five-year period before the war (1910-1914) and the war-time period (1915-1918).

Considering the unit as a whole, both the frequency and severity were less in the war period than in the pre-war period. A closer study of the figures reveals that the 1910 high-water mark was so much above any of the succeeding years that it alone was sufficient to account for much of the discrepancy. The frequency rate declined from 177.7 cases per thousand 300-day workers to 129.6 cases in the war period. The severity rate declined from 12.3 per worker to 10.9. In 1910 the figures covered 202,153 300-day workers of whom 3273 were killed, 848 were permanently disabled—with an average disability per worker of 15.9 days. In 1911 the number of workers increased to 231,544. But of this number only 204 were killed; permanent disability figures rose to 931, and temporary disabilities fell to 34,676, with an average for all disabilities of 10.4 days per worker. In the first year of the war period, 1915, the total number of workers slumped to 116,224, with 87 deaths, 372 permanent disabilities and 13,481 temporary disabilities, and making a low-water mark of 119.9 disabilities per thousand workers and a disability record of 8.1 days lost per worker. In 1918 the industry had reached its high-water mark of employment, with 455,360 workers; 496 deaths; 1209 permanent disabilities and 52,896 temporary disabilities with a disability loss per worker of 10.6 days.

The blast furnace record shows an even more decided improvement than the industry as a whole. Its accident frequency rate dropped from 186.7 cases per 1000 300-day workers in the pre-war years to 118.3 in the war period, while the severity rate dropped from 21.4 days to 15.7. In the Bessemer furnaces the frequency rate fell from 269.3 to 196.3, while the severity rate increased from 19.0 to 22.8; and the open hearth furnaces fell in frequency rate from 224.9 to 155.2; but again the severity rate increased from 19.7 to 21.0.

In the foundries the frequency rate for the pre-war period was 190.8 and during the war interval it rose to 194.0. The severity rate increased from 10.0 to 11.5. The record for the heavy rolling mills showed a frequency rate of 138.0 and 97.5 during the war, while the frequency rate rose from 11.0 to 12.0. The frequency rate in the plate mills was 149.1 before the war and 132.0 during the war, while the severity rate fell from 11.4 to 8.4. The sheet mills record a frequency of 153.3 before the war and 107.7 during the war, with severity rates of 7.7 and 6.0 respectively.

The lowest record is that of the tube mills which showed a frequency rate of 121.5 before the war and 68.1 for the war period, with severity rates of 6.6 and 5.4 respectively. In the fabricating shops the frequency rate dropped from 239.7 to 172.7, and the severity rate from 10.4 to 8.7. In the unclassified rolling mills, the frequency rate decreased from 219.8 to 128.5, and the severity rate from 10.8 to 6.5. The wire-drawing industry showed a decrease from 197.1 to 150.0 in the frequency rate and from 9.5 to 8.5 in the severity rate.

The heaviest mortality as well as accident rate is that in the erection of structural steel. Out of 2157 300-day workers in the years 1912-1913-1914 there were 26 deaths, 24 permanent disabilities and 738 temporary disabilities, which gives an accident frequency rate of 365.3 per thousand 300-day workers and a loss of 94.2 days for each 300-day worker. In 1918 the figures decreased slightly. Out of 1234 300-day workers, there were 10 deaths, three permanent disa-

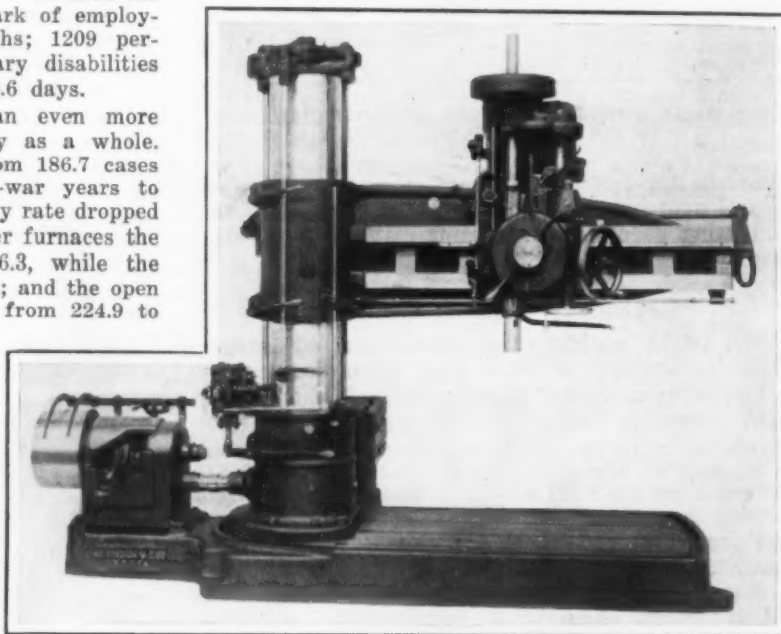
bilities and 364 temporary disabilities, giving an accident frequency of 30.5 and a disability rate of 58.8.

The death rate in the erection of structural steel is markedly in excess of that in coal mines, says the report of the Bureau of Labor Statistics.

Combination Pneumatic and Hand Clamping Device

A pneumatic device for clamping the column and which can also be clamped by hand is announced by the Fosdick Machine Tool Co., Cincinnati. It is for use with the company's 4, 5 or 6-ft. heavy duty radials. A noticeable feature is the location of the cylinder, which, it is pointed out, not only brings the pressure directly to the point of clamping, but also eliminates a number of the usual working parts. It is explained that the cylinder will operate equally as well on very high or very low pressure, and during tests operated successfully on 45 lb. pressure. Relief valves are provided for each end of the cylinder and are regularly set for a pressure of 45 lb., although 150 lb. or more, it is stated, will show no shock or jar in clamping or unclamping. This is accomplished by an air cushion at each end of the cylinder formed by additional ports in the valve to cause a compression at the proper termination of each stroke.

The valve, a six-ported flat disk valve, is operated by mechanical connection to a horizontal shifter bar running along the entire length of the radial arm. The advantage of this device is that it has no connection with and does not interfere with the moving of the



The Pneumatic Cylinder of the Clamping Device on This Heavy Duty Radial Is Located So as to Bring the Pressure Directly to the Point of Clamping and Eliminate a Number of the Usual Working Parts.

spindle head. In case of failure of the air, pet cocks at each end of the cylinder are opened and the ordinary method of clamping by hand is used.

The method for disposing of breeze from blast furnace coke in use at the plant of the Weirton Steel Co., Weirton, W. Va., is described in No. 8 of Depere Service, published by Depere Mfg. Co., Chicago. The coke breeze is screened out just before the charging skips are loaded, and is delivered by auxiliary skip equipment from the pits beneath the screens to bins whence it can be spouted to cars for disposal.

The Navy Department has announced that sales of surplus iron and steel will be made at the office of the Board of Survey, Navy Yard, New York, on Dec. 30. Included are scrap iron and steel, bolts and nuts, drop forgings, boiler tubes, etc. Inspection may be made by application to the Navy Yard, New York.

Pulverized Coal in Open-Hearth Practice

A Review of the Experience of Eighteen American Steel Plants—Feeder and Burner Mechanism—Proper Furnace Design

—BY W. H. FITCH*

OF the several types of metallurgical furnaces which have been operated with pulverized coal, the basic open-hearth has presented the most interesting study, due to its complexity of design compared with the reverberatory or non-reversing type. The principal concern in the beginning was what effect, metallurgically, the ash would have when coming in contact with the bath. This, however, was soon established to the satisfaction of those concerned.

A search for information as to how a furnace should be designed to properly burn pulverized coal proved unavailing. As was to be expected, this resulted in the application of pulverized coal to some existing furnace, which after a short run developed numerous difficulties, the most annoying of which was the clogging of checkers in the regenerative chambers with ash and the filling of slag pockets, either one or both of which were the controlling factors in the number of heats that could be made without shutting down the furnace for cleaning.

Prior to the advent of pulverized coal firing, producer gas was the generally accepted form of fuel for steel melting in open-hearth furnaces, and for this reason the average furnace met with, in the application of pulverized coal, was designed for producer gas although in some cases the fuel was natural gas or oil.

Upon investigation we find a difference of opinion as to the best design of furnace for producer gas, even where the furnaces are of a given capacity and have been operating under similar conditions for several years. Some melters claim better results are obtained with one air port, others with

two; bath areas vary from 6 to 10 sq. ft. per ton of steel in figuring capacity; opinions differ as to the cubical capacity of regenerative chambers—slag chamber and height and shape of roof. In many instances we find the furnace above the charging floor has been changed from time to time to increase capacity without increasing the capacity of regenerative chambers. Steam boilers are in favor with some and not with others, all of which have their influence and assist in explaining why the results are so variable.

In almost every instance where a change of fuel had been made, as in the case of natural gas taking the place of producer gas, we were told considerable trouble had been experienced in learning the most economical design of neck, port, etc. Therefore, it is to be expected that a change from producer gas to pulverized coal as a fuel would require a very careful study in design to meet the new conditions.

Advancement in the art of applying pulverized coal during the past two years has undoubtedly been retarded due to the abnormal conditions in the steel trade and the unwillingness of the operators to make changes in furnace design and thereby interfere with production.

With these facts in mind let us proceed to investigate the application and use of pulverized coal to open-hearth furnaces in several different plants that formerly used producer gas, natural gas and in some instances fuel oil. There are about 18 plants with a total of 70 furnaces operating with pulverized coal which will be referred to as A, B, C, etc., as a matter of convenience. Reference to two installations is omitted by request.

Experience of 18 Plants Using Powdered Coal

Steel Plant A

Product: Billets, sheet-bars and cotton-ties.
Six 30-ton furnaces (3 basic and 3 acid),
built for producer gas.

Pulverized coal was applied to furnaces designed for producer gas and subsequently fired with fuel oil. Before starting with pulverized coal the checkers were removed and baffle walls substituted.

Coal dust was conveyed from the pulverized coal bins to the burners by air at 6 oz. pressure. Compressed air at 80 lb. pressure per sq. in. was introduced at the burner.

The downtakes were narrow and slag pockets small. The bulkheads burned out quickly. Flues leading to stack had to be pumped out occasionally. Heats were made in 8 to 9 hr. with 600 lb. coal per ton metal poured.

Quality of metal from basic furnaces was first class, while the acid steel was not satisfactory.

After some months of operating with pulverized coal the fuel economy was offset by disadvantages that could not be changed or corrected conveniently, and fuel oil, which had been used and was well adapted for acid process, was again resorted to and applied to all furnaces.

Steel Plant B

Product: Steel castings for railroad use.
Four 30 and three 15-ton basic furnaces,
built for producer gas.

These were all originally built as acid furnaces, producer-gas fired. They were then converted to fuel-oil fired and basic bottoms installed. Since 1913 they have been in continuous use with pulverized coal as a fuel.

The separate gas and air checker chambers of the original furnaces were changed by throwing them into one chamber at each end of the furnace, although immediately under the furnace, a small slag car being located directly under the down comers in this chamber. The checker brick are placed to form large flues with a direct vertical passage at quite a sacrifice of checker area, but without the effect of losing time in making heats. The same time was maintained as that when fuel oil was used, three heats in 24 hr.

The coal varied from 0.50 to 1 per cent sulphur, and the ash from 4 to 6 per cent with normal coal. This did not apply to coal received during the war, however, as the ash content went very much higher, due to poor mining practice. The smaller furnaces were used for pre-melting steel for electric furnaces, each furnace making from five to six 10-ton heats in 24 hr. No finishing, of course, was done in the furnace.

The net saving by using pulverized coal compared with fuel oil during the past two years has been very great. Heats to the number of 250 to 300 are made without rebuilding roof; the roof forms a straight line from bulkhead to bulkhead.

Fuel consumed averages 550 lb. per ton of steel tapped for the year. This is a little higher than

*Manager, metallurgical department, Fuller Engineering Co., Allentown, Pa.

would be the case in making ingots, as the metal must be hotter for pouring castings and, further, the heat is held longer for obvious reasons.

Steel Plant C

Product: Steel.
One 25-ton basic furnace, built for pulverized coal.

The slag pockets are larger than those originally on this furnace for oil firing. The regenerative air chambers are built back of the slag pockets and are longer than on the original furnace. These chambers each have a capacity of about 80 cu. ft. per ton of metal melted.

Much trouble was experienced with the coal feeder, a double screw type, one screw above the other, with an air column passing between the upper and lower screw, it being intended to return the surplus coal dust by the lower screw. This arrangement was finally removed and a modified screw and air syphon feed substituted.

There were 162 heats made without a shut down.

Fuel consumption averaged about 700 lb. of pulverized coal per ton of charge.

Much to encourage the management in using pulverized coal resulted, but the need for steel became so urgent, and as the other furnaces were operating on oil, it was found desirable to operate all furnaces on one class of fuel only at that time, and the furnace was changed back to oil.

Steel Plant D

Product: Steel castings.
One 20-ton acid furnace, built for producer gas.

The furnace design was not altered and the slag pocket and checkers soon became clogged. The coal was pulverized at an adjoining plant and carried to the furnace in steel containers which were placed at the end of the furnace and then connections made to burner.

Coal was not pulverized to the proper degree of fineness.

After one week's operation it was pronounced unsatisfactory and discontinued.

Steel Plant E

Product: Ingots.
One 30-ton basic furnace, built for producer gas.

This furnace has small slag chamber. No checkers used. Regenerative air chambers so arranged that they may be cleaned during operation of furnace.

Coal consumption averaged 650 lb. per ton of metal poured. Charge is made up of cold and hot metal.

There were 75 to 125 heats made before repairing the room. Quality coal used covered a wide range from 1 to 3 per cent sulphur and 7 to 14 per cent ash.

Steel Plant F

Product: Ingots for wire and wire nails.
One 35-ton basic furnace, built for pulverized coal.

When it was decided to install pulverized coal a furnace was rebuilt to conform to the requirements as they were then known. The walls and roof were 9 in. thick; combination screw feeders and burners were used; the coal averaged 1 per cent sulphur and 6 per cent ash; slack coal was used for pulverizing, the lump coal going to the gas producers.

After a several months run it was found that the quality and quantity of steel produced was satisfactory compared with that made in the producer-gas fired furnaces, but an average of 4 days a month was required for cleaning slag pockets and checkers. Various arrangements of checkers and baffle walls were employed; the latter, however, were found faulty and abandoned, using checker brick arranged with vertical and horizontal openings. The slag pockets were too shallow and were deepened with improved results.

By the end of the first year it was demonstrated that the walls and roof were too thin, that the steel binding was too light to hold heavier walls and roof and the furnace was torn down to the charging floor and rebuilt with 13½ in. walls.

The next period of operation—12 months—resulted in an average production of 2800 tons of steel per

month and fuel consumption of 490 lb. coal per ton of steel tapped. The best monthly production was 3300 tons of ingots, while 9000 tons have been produced in three months with an average coal consumption of 440 lb. per ton of ingots poured.

The slag chambers are being made wider, it having been found desirable to make these the maximum permitted by building conditions, as past experience indicates that the number of heats that can be run without stopping is limited to the capacity of the slag chambers. The checker space as arranged at present is about 50 cu. ft. per ton of metal poured. The space available makes it impossible to enlarge the checker area and improve conditions in this direction.

The results of three years operating with pulverized coal are very satisfactory and plans are being made to install an additional furnace designed with a dust chamber to burn pulverized coal, sufficient space being available.

Steel Plants G, H, I

Product: Ingots and billets, etc.
Thirty-five 50-ton basic furnaces, built for producer gas.

These plants employ furnaces of practically the same capacity and design operating under similar conditions, therefore it will be convenient to refer to them collectively.

Although the furnaces were designed for producer gas, natural gas was used. The bath area is approximately 480 sq. ft. or 8 sq. ft. per ton of metal.

The ports were four in number and so arranged that the necks of the furnaces were 15 ft. from the bulkhead to the bridge wall, much longer than furnaces that had been previously fired with pulverized coal.

Slag pockets were of small cubical capacity, while the checker space in regenerative chambers (air and gas combined) were very large, approximately 150 sq. ft. per ton of metal.

A semi-duplexing process was the practice, charges consisting of 50 per cent cold metal and 50 per cent hot metal, on the average. At times as high as 80 per cent hot metal was charged and oftentimes this was blown.

Heats were made in 5 to 12 hr., according to the charge.

During the winter of 1916 there was a scarcity of natural gas and the management became interested in finding a substitute, fearing the necessary supply of gas would not be obtainable.

The encouragement received from visiting several small plants using pulverized coal, as well as results obtained by their own experiments, influenced them to install pulverized coal equipment. In one case the steel company let a contract to an engineering company to install pulverizing machinery, distributing system and furnace fixtures and in the others purchased the equipment and installed it themselves. We refer to the plant that was built by the engineering company.

It was the consensus of opinion of the several interested parties that furnace design was the principal factor that would require careful study, and it was decided that it would be best to make as little change as possible to begin with, allowing result of experience of applying coal dust to one furnace to point the way and nature of changes necessary. Pulverized coal screw feeders of the single screw type and combination burners were used.

The distance between the bulkhead and the bridge wall was too great for the design of burner, resulting in combustion being too far advanced before the gases reached the bridge wall. To overcome this a dog house was built and the burner was equipped with a telescopic device projecting the coal further into the furnace. The result of all this was unsatisfactory, due to the dog house burning out every few heats, and it was abandoned.

The necks of the furnace were shortened a little, improving flame conditions and control and decreasing time of heats proportionately. This condition was improved by widening the necks of the furnace to obtain greater port area. Improvement was continued until the division walls between the ports were removed, a water cooled heel-wall being found a satisfactory substitute.

The best arrangement that could be made, however, did not produce results that were as satisfactory as was desired, the objection being that the roof over the neck burned badly. A siphon burner was substituted, which brought relief so far as refractory trouble was concerned, as it was possible to project the coal further into the furnace; on the other hand, unburned gases passed through the furnace and burned in the slag pockets. The latter was the least objectionable, as the fuel ratio was less important than production.

Due to a number of furnaces being in use it was possible to make minor changes at various times when a furnace was down for repairs, and in this way different arrangements of checker brick, ports and roof were experimented with. Changes that could be made easily to the furnace above the charging floor were limited, due to the necessity of making very radical changes in steel work, which for the time being were prohibitive.

The checker chambers of these furnaces being large afforded ample space to experiment with arrangement of checkers. Large flues, small flues and a combination of both, as well as different depths of checkers, were tested, with the result that the combination gave the best results.

Eventually the slag chamber was found to be a very important factor, as its capacity decided the number of heats that could be made without stopping the furnace for cleaning. When the slag pocket filled it obstructed the area of fan tail or permitted the gases to carry oxides and ash directly into the checker chamber. There were 240 heats obtained without cleaning checkers with the best coal, while only 75 heats could be obtained without cleaning the slag pocket.

The final method of operating was about as follows: After 75 heats, clean slag pockets; after 150 heats, clean slag pockets and checkers; after 225 heats, clean slag pockets; after 300 heats, clean slag pockets, checkers and repair roof and walls.

Based on results of several months the coal consumption was approximately 500 lb. per ton of metal poured on a basis of all metal charged cold. Time of heats, tap to tap, 4 to 11 hr. Varying quality of coal was used, analyzing from 1 to 3 per cent sulphur and 7 to 14 per cent ash. The poor quality was very undesirable on account of both sulphur and ash being so high, but the ash caused the greatest objection on account of the small capacity of slag pocket and the extra labor involved in cleaning these and the checkers.

The fact that hot metal formed part of the charge caused a slag to be formed immediately, and this afforded protection to the metal, much of the sulphur leaving the furnace in the form of sulphur gases.

The necessity of remodeling furnaces for improved results with pulverized coal and the impossibility of making the change during the war led the companies to return to natural gas fuel, which was again obtainable in satisfactory quantity.

Steel Plant J

Product: Steel castings.
Four 25-ton basic furnaces, built for producer gas.

These furnaces have been operating continuously with pulverized coal since 1915, the fuel consumption per ton of charge being 510 lb. average for the year. This is very good compared with fuel used in furnaces producing ingots, as the castings require hotter metal and the heats are held longer in the furnace. Many of the castings made are $\frac{1}{2}$ in. in cross section. About one hour is required to pour a heat.

The gas producers that were installed originally have been dismantled and sold. It is interesting to note that the fuel consumption was 800 lb. coal per ton of metal charged when coal was gassified. The cost of pulverizing is 72c. per ton of metal charged,

at present prices of power, labor, repairs and material for repairs.

The cost of furnace repairs is about the same as when using producer gas.

Heats are now made regularly in less than seven hours and 300 heats have been obtained without shutting down for repairs.

The checkers are now cleaned daily from the outside through openings in the walls. The larger part of the dust which settles is dry and flaky and can be easily removed by blowing. The rest is removed by poking. This dust, which falls to the bottom of the checkers, is scraped out once a week. Two men are required to do this work and they have no difficulty in keeping the furnaces in good condition during the run.

The regenerative chambers are directly beneath the furnace, resulting in higher temperature of checkers. The furnace roof forms a straight line from one bulkhead to the other.

The bath area is 11 ft. x 23 ft., or about 10.1 sq. ft. per ton of metal.

Coal used analyses $3\frac{1}{2}$ to 5 per cent ash and $\frac{1}{2}$ to 1 per cent sulphur, with a volatile carbon content of 35 per cent.

A screw feeder and burner combination utilizing air at 8 oz. and 40 to 50 lb. is employed.

Steel Plant K

Product: Ingots, blooms, billets, etc.
Four 50 and two 80-ton basic furnaces, built for fuel oil.

Pulverized coal equipment was installed at this plant in 1913, and since that time the furnaces have been in continuous service with very satisfactory results.

Furnace slag chambers are large and equipped with car bottoms.

Data as to fuel consumption, number of heats on roof, and time of heats not obtainable.

Steel Plant L

Product: Ingots and special forgings.
One 18-ton basic furnace, built for fuel oil.

Pulverized coal was used as an experiment and proved very unsatisfactory. The operators, not being familiar with its use, ran too high a temperature and melted the doors and roof. The test lasted only one week.

Charges consisting of scrap, pig iron not being obtainable, were melted in 2 hr. The molten metal was taken to the electric furnace for refining.

Checker arrangement was not satisfactory and soon clogged with ash.

Coal used analyzed 1.5 per cent sulphur and 8 per cent ash.

Steel Plant M

Product: Castings for railroad use.
One 15-ton acid furnace, built for producer gas.

Furnace was equipped to burn pulverized coal. It has been fired on several occasions, but is not ready for regular service.

The furnace design is similar to other small furnaces referred to in this paper, where the regenerative chambers are located beneath the furnace with a slag buggy located between, the principal difference being that the furnace under discussion has an acid bottom.

The method of conveying coal to the furnace is to mix coal with air until a saturation point of the latter is reached. Air pressure of approximately 1 lb is used. The mixture is applied directly to the furnace; no pulverized coal storage bin used. Part of the air supply for combustion is drawn from the regenerative chambers.

Coal used for pulverizing contains 1.4 to 2.2 per cent sulphur.

Recapitulation and Conclusions

From the foregoing it will be apparent that the problem of using pulverized coal successfully as a fuel for open-hearth furnaces involves a study of several conditions such as the process, charge, prod-

uct, quality of coal, burners and design of furnace.

Making acid steel has not been successful, due to the fact that the coals pulverized were not of the proper quality (low in sulphur). The basic process

results however were very satisfactory from a metallurgical standpoint.

Among the plants mentioned we find the pig and scrap are charged cold in some instances and in others 50 per cent cold metal and 50 per cent hot metal, and at times 80 per cent of the hot metal was blown.

The cold charge is subjected directly to the action of the flame in melting down and will absorb sulphur if any is present. In the case of semi-duplexing or duplexing, this condition is greatly reduced due to the fact that a slag is created immediately upon the hot metal entering the furnace. Obviously practice will vary as to quantity of steel produced per month in a given sized furnace under these conditions.

Quality of product is readily obtainable with pulverized coal by selecting the pig and scrap and adding a little more lime. In one of the plants referred to a heat is made occasionally when specifications call for 0.45 per cent carbon and no trouble is experienced.

Quality of Coal

The quality of coal used for pulverizing is the same as that used previously when gas producers were employed in many instances, although very poor grades were used when the desirable kind was not obtainable. Coal analyzing 3 per cent sulphur and 14 per cent ash was used successfully in a semi-duplexing process for a short period. In one case where gas producers and pulverizers are used in the same plant, the coal is screened, the lump coal going to the gas producers and the slack to the pulverizers, and there is no appreciable difference in the quality of the product.

It should not be understood from this statement that the high sulphur coal is preferred or as good as low sulphur coal for duplexing as it cannot be for obvious reasons. The use of high sulphur coal where it was used was compulsory during a period when no other kind was available. High sulphur coals for open-hearth steel melting are not desirable for metallurgical reasons aside from mechanical considerations.

Sulphur in the coal and its effect upon the charge when melting depend upon the percentage of sulphur in the coal and the fineness of the coal when pulverized. If the coal contains a low percentage of sulphur and the product when pulverized contains a high percentage of impalpable powder, a gaseous condition is established immediately when the powder is projected into the furnace, and the sulphate present is apparently oxidized and carried out of the furnace with the waste gases. Coals containing over 1.5 per cent sulphur are not desirable in any event.

A 200 mesh sieve should be used for measuring fineness and 85 per cent of the product should pass through. Sieve tests are the only practical method we have of testing at the present time and it must be remembered that this determines only the quantity of material passing through, leaving the fineness to be determined by other means.

The fineness to which the coal is pulverized will be reflected in the time of heats—the higher the percentage of impalpable powder in the product the nearer a fixed gas condition is approached and the faster the heat.

Burner and Feeder Mechanism

The feeder and burner mechanism is more important than would seem at first thought. The coal feeder is attached to the bottom of the coal bin and controls the flow of pulverized coal to the column of low pressure air used for conveying the

mixture to the burner. The burner itself is only part of the apparatus, its function being to convey the mixture of coal dust and air to the furnace, at the same time permitting the velocities to be reduced without separating the coal dust and air. The burner is fitted with a high pressure air jet to insure the mass being projected into the furnace the proper distance before combustion is completed.

Burners of this type attached to a furnace with a very long neck have not been successful due to combustion taking place before the gases cross the bridgeway, and as a result the roof over the neck was burned unnecessarily.

Another method is to siphon coal from the pulverized coal bin, the latter being used in furnaces with long necks which could not be conveniently changed to overcome the objection met in the use of the screw feed type, although the former has not been found the most efficient as regards fuel consumption per ton of metal poured.

There are two combinations of air pressure in use at the present time, due to the different design of furnaces and conditions. Where the screw feeder is used 6-oz. pressure is employed to convey the pulverized coal to the burner at which point a very small quantity of air at 80 lb. pressure is used to mix the mass with the volume of air coming from the regenerators. Where the siphon is used the 6-oz. air is eliminated.

The quantity of cold air introduced into the furnace in the form of a vehicle is estimated to be 15 per cent of the total air required for combustion.

The best results obtained is the use of a pressure which will give the proper mixture of coal and air at a minimum velocity through the furnace affording time for combustion in the place where it is wanted—the heating chamber and not in the downtakes and slag chambers.

Oxidation resulting from the use of pulverized coal is comparable with best practice where other fuels are used. Due to the impalpable powder to which the coal is pulverized and its independent control make it possible to mix with air in different proportions as required. A reducing, neutral oxidizing flame condition is readily obtained.

Time of heats, tap to tap, in a 50-ton furnace vary according to the nature of the charge. With all metal charged cold consisting of 30 per cent pig and 70 per cent scrap, an average of 11 hr. for a period of one year has been obtained.

Production in most of the furnaces using pulverized coal has been very satisfactory. The fact that its use is being continued under very unfavorable conditions in some plants is significant.

A monthly average of 2800 tons of ingots is being obtained in one plant where all metal is charged cold, and the furnace is not an ideal design. In another plant, all cold charges, 12,000 tons of ingots per month was averaged over a period of half a year. Where semi-duplexing is practiced the average for the month was 30,000 tons.

Coal consumption is very uniform in the various furnaces, taking into consideration the difference in furnace design and burners. The best practice is 500 lb. of coal with a maximum of 700 lb. on a cold charge basis.

Repairs Per Ton of Metal

Repairs per ton of metal poured is a great variable. In some furnaces the cost of refractories is as low as 28c per ton and in others as high as 70c per ton. The great difference in design of furnace is responsible for excessive refractory cost. With well proportioned furnace the cost of refrac-

tories should not exceed 25c per ton, all economies considered.

The common method of distributing is the screw conveyor connection being made to pulverized coal bin at each end of each furnace by means of spouts. Some attempts have been made to eliminate its pulverized coal bin at the furnace projecting the coal and air mixture directly into the furnace, but up to the present time this has not been very successful. A supply of pulverized coal at the furnace, making each furnace an independent unit, is to be preferred for obvious reasons. Distributing coal by high pressure air through a small diameter pipe, the coal dust being separated by a cyclone and precipitated into the pulverized coal bin, has been introduced and promises to be satisfactory under certain conditions.

Pulverized coal bins of different design are in use and generally speaking there is little difference to the casual observer. However, the design is important to insure the steady flow of coal dust and this is best accomplished by using a bin with one side straight, 90 deg. The capacity of the bin need not exceed 6 tons for proper operating conditions on a 50-ton furnace. Bins should be equipped with a vent.

Furnace Design

Furnace design is undoubtedly the most important item of the several mentioned, as the success of pulverized coal firing depends upon the smoothness of operation and the minimum time required for repairing the furnace. If the furnace is not properly designed the cost of material and labor for repairs as well as the production sacrificed may offset the advantages of firing with pulverized coal.

It has been learned that a design had to be

by a poorly constructed furnace or bad operating conditions.

The most economical results are obtained by returning all of the waste heat available to the furnace, and a design of furnace that will provide for the accumulation and removal of fine ash after passing through the slag chamber will have the effect of cleaning the gases before they enter the regenerative chamber and it will be possible to so arrange the checker brick to form flue areas that will absorb the maximum quantity of heat from the outgoing gases and permit the incoming live air to be heated to the desired temperature.

In our opinion a dust chamber of sufficient volume located between the slag chamber and the regenerative chamber affording a low velocity of gases will cause precipitation of a large quantity of fine ash, and any particles that remain in suspension will be carried with the waste gases out

Horsepower	
Producers	50
Crusher	35
L.	10
100-ft. conveyor over bunker	5
Dryer	25-ft. 1
	100
	196

of the furnace. It is a mistake to apply pulverized coal to an improperly designed furnace. In the event of building a new plant there is sufficient data available to enable one to build a practical furnace.

Steam boilers should not be necessary in a properly designed and operated furnace as the temperature of outgoing gases should not exceed 700 deg. Fahr.

Producers		Pulverizers	
Power, 75 kw. \times 24 hr. \times 1c.	\$18.00	122 kw. \times 24 hr. \times 1c.	\$29.28
Gas and ash man, 18 \times 8 \times 60.	86.40	3 \times 8 \times 60c.	14.40
Dryer man		3 \times 8 \times 60c.	14.40
Pulling man		180 \times 2c.	3.60
Unloading coal, 240 \times 2c.	4.80	180 \times 10c.	18.00
Repairs, 240 \times 10c.	24.00		
Steam	44.40		
Circulating water, 200 gal. per min.	4.80		
	\$182.4		\$79.68
	240		180
	= \$0.76		= \$0.45

worked out and by comparison we note that much has been accomplished with a furnace embracing a slag chamber of large cubical contents, having a removable bottom, affording the gases an opportunity of expanding and precipitating the heavy oxides and molten ash, and with regenerative chamber at each end of the furnace, of large volume, provided with observation and cleaning doors, the checker brick being assembled to provide vertical flues of comparatively large area and the waste gases passed through a boiler.

In this class we find two methods of operating, one in which the fine ash is blown through the regenerative chamber and out of the stack, the checkers arranged to form large vertical flues; and the other where the checker arrangement, forming small flues, catch a large quantity of the ash making it necessary to clean continuously or close down every few weeks for cleaning. The first method is subject to a loss of heat unless waste-heat boilers are used and in the second, extra labor is required.

In most instances the placing of checker chambers under the furnace is objected to for obvious reasons, and as a rule waste-heat boilers are used as the only means of avoiding a loss of heat caused

Accidents and Explosions

Casualties have attended the use of pulverized coal as has been the case with all kinds of fuel. The number has been small and in many instances were the result of negligence on the part of the operator. Coal dust explosions are impossible without mixing it with air, and when transported or stored in bins at furnaces it has been kept inactive for weeks without any disadvantages.

Certain coals will fire spontaneously under certain conditions, whether in lump or pulverized form, and if this happens with the latter in a bin at the furnace, it need not be a cause for alarm to the extent of stopping the furnace and emptying the bin, as it is only necessary to stop the feeding of coal into the bin, allowing the furnace to continue until the smoldering coal dust has been consumed, after which an inspection should be made to ascertain if there is any carbon accumulation to be removed.

We are frequently asked the comparative value of pulverized coal and gasified coal, and from the best information obtainable in practice we have tabulated the cost of these two methods covering power, labor, repairs and material for repairs, taking as a base 10 mechanical gas producers and two

pulverizers with a rated capacity of 240 and 180 net tons of coal per day of 24 hr., the pulverizing method requiring 25 per cent less coal.

The best grades of gas coal highly desirable for gasification are more costly at the present time and attempts are made to use cheaper grades. Only those who have operated producers can appreciate the lack of satisfactory performance in the case of gasifying poor grade coals, involving great

expense of labor, low gas value and slowing down of time in making heats, all of which influence the cost of fuel per ton of steel poured.

Records of the amount of coal gasified in many large steel plants show a wide diversity as to results. Some run as low as 500 lb. of coal under certain conditions, while many plants use from 900 to 1000 lb. of coal per ton of steel poured.

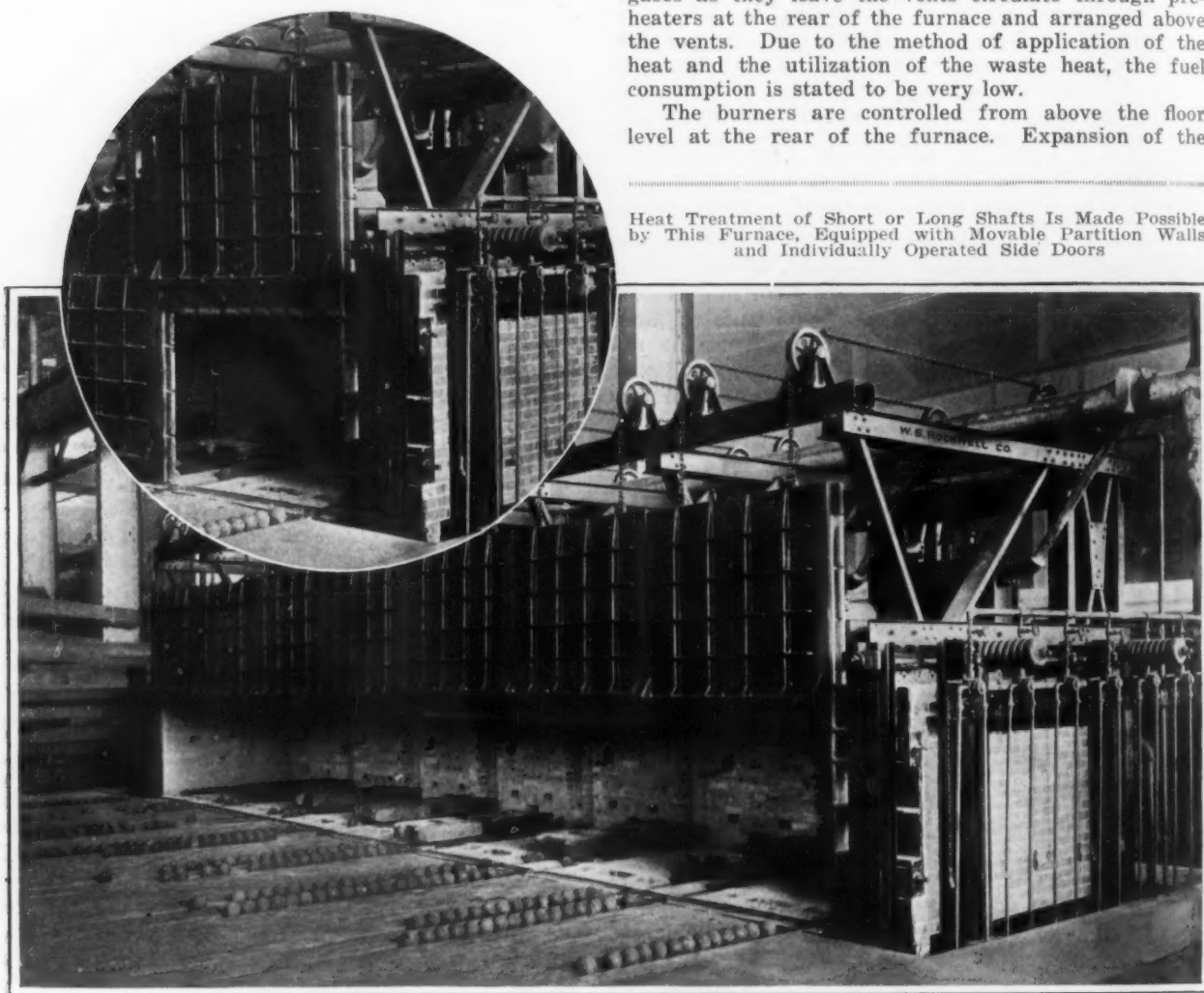
Side-Opening Heat Treatment Furnace

An underfired side-opening furnace intended for use by those forging shops which handle material differing widely in shape and size has been developed by the W. S. Rockwell Co., 50 Church Street, New York. The furnace, as shown in the accompanying illustrations, was originally built with the chamber 5 ft. 9 in. long from front to rear and 36 ft. wide. In order to anneal

The roof and the door lift rigs are suspended from the overhead truss. Oil or gas may be used as fuel, the combustion taking place in a series of combustion chambers located under the hearth. This location is emphasized as insuring a hot bottom and the best of heating conditions. Some of the gases in the heating chambers are siphoned back into the combustion chambers, thus to insure complete circulation and uniformity of temperature throughout the heating chamber. The spent gases as they leave the vents circulate through pre-heaters at the rear of the furnace and arranged above the vents. Due to the method of application of the heat and the utilization of the waste heat, the fuel consumption is stated to be very low.

The burners are controlled from above the floor level at the rear of the furnace. Expansion of the

Heat Treatment of Short or Long Shafts Is Made Possible by This Furnace, Equipped with Movable Partition Walls and Individually Operated Side Doors



and heat treat the largest shafts and similar pieces handled in the forge shop where it is installed, the furnace is now being lengthened to provide a working chamber 105 ft. wide in the clear, the length remaining the same. The construction is such that the furnace can be built of any width and any reasonable length.

The furnace is provided with movable partition walls and can be divided into seven separate chambers, each approximately 5 ft. wide. The doors covering the working openings can be raised or lowered independently of one another. Doors are dovetailed and form guides within themselves that prevent the escape of hot gases, and are raised and lowered by compressed air and counterweights. Each individual valve operating the air hoists are located at the side of the furnace, from which point the operator can see the doors.

The roof is constructed of flat tiles, thus to avoid the thrust caused by the ordinary arch construction.

brickwork, or of the furnace as a whole, is taken up by heavy springs which can be seen at the side of the furnace. The overhead trusswork has been divided to prevent distortion due to the heat in the furnace.

If the pieces to be heated are small, they may be placed on the floor of the furnace; or if they are large and rather unwieldy, heavy cast-steel trucks may be used, upon which the pieces are supported above the floor level, special provision also being made to take care of the expansion of the pieces within the furnace.

On Oct. 1 the Dickey Steel Co., Inc., Woolworth Building, New York, was appointed Eastern sales and export representative of the Hammond Steel Co., Inc., Syracuse, N. Y., manufacturer of high grade electric furnace, alloy and carbon steels in the form of ingots, billets, bars, die blocks, weldless ring forgings and special shapes.

The Truth About the Rock Island Plan

Arsenal Scheme of Employee Organization Neither Subversive to Discipline nor Prejudicial to Authority of Management

BY GILBERT L. LACHER

WHAT is the truth about the Rock Island plan? This question, no doubt, has arisen in the minds of many who have read the conflicting press reports regarding the character of the scheme of employee organization in effect at the United States arsenal, Rock Island, Illinois. Articles published in some of the leading newspapers, particularly in the East, conveyed the impression that the plan transferred authority from the management to labor and constituted a revolutionary development in industrial relations, strikingly similar in many respects to the soviet idea now in vogue in Russia. It was charged that arsenal employees elected their own foremen and determined their own rates of pay. It was also alleged that the workmen had formed a sales organization to compete for business with private manufacturing plants.

Because of the general interest in the Rock Island plan and the seeming paradox of the creation of so radical a scheme in a military organization, the IRON AGE sent a representative to Rock Island to determine if the current reports had any foundation in fact. Through the courtesy of the management and employees from whom he secured detailed information concerning the organization and operation of the arsenal works council, we are able to present an exposition of the plan.

Plan Intended as Preventive of Misunderstanding

At the outset it may be said that the works organization of employees at the Rock Island arsenal, is neither subversive to discipline nor prejudicial to the authority of the management. The plan is intended only to provide a definitely organized means of communication and conference between the management and the employees of the arsenal. Like the works council plans in effect in a number of large industrial institutions, such as the International Harvester Co., it aims to prevent misunderstanding and preserve harmonious relations between employer and employees through the operation of established machinery for the discussion and adjustment of matters of mutual interest.

The Central Council

The instrument of communication between the workers and the management is the Central Council, a body made up of 39 employee representatives, elected from 13 divisions of the arsenal—three representatives for each division. The council elects a chairman and secretary and designates four members to act with the chairman as a Conference Committee to meet with the commanding officer, and from officials of the arsenal appointed by him as representatives of the management. These 10 men with the commanding officer as the chairman, constitute the Joint Conference Committee. Twelve standing committees, of two members each, are elected by the council to meet with a like number of representatives of the management, appointed by the commanding officer. These committees have been assigned such specific duties as have been mutually agreed upon by the Joint Conference Committee. Council members are eligible for duty on only one of these committees, unless otherwise determined by the joint committee.

Final Authority Rests With Commanding Officer

The three Council representatives from each division constitute a Department Committee and are expected to make every effort to settle all departmental matters with the civilian or officer in charge of the department. In case of disagreement, however, the point at issue is referred

to the joint standing committee having jurisdiction. If, after a thorough investigation by that body, no decision is reached, the case, together with a full written record, goes to the Joint Conference Committee. Although this is the normal procedure, individual employees or groups of employees have the privilege of presenting any matter directly to the Central Council or to the Commanding Officer or his representatives, but exercise this right only under exceptional circumstances. If the Joint Conference Committee fails to dispose of a case referred to it, the final decision rests with the Commanding Officer. Although no machinery has been provided in the council plan for any appeal from his decision, employees, as individuals, are authorized under statute to bring their grievances to the attention of the Chief of Ordnance and, if not satisfied with his disposition of the case, may appeal to the Secretary of War.

It is not anticipated, however, that many matters will have to be referred to the Commanding Officer or that individual employees, dissatisfied with his treatment of a case, will feel called upon to exercise their legal right to appeal to Washington. At any rate, the principal purpose of the Rock Island plan is to provide a common forum where workers and officials can freely meet, frankly discuss their problems, and by becoming acquainted with all viewpoints on a given question, arrive at a mutually satisfactory agreement. The scheme was created on the theory that misunderstanding is the mother of unrest and that the surest way to preserve harmonious relations between employee and management is to furnish a vehicle of expression whereby the views of the working force will win appropriate attention.

Employees Exercise No Executive Functions

Through the council plan the employees are at liberty to make any recommendation they see fit. If these meet the approval of the management representatives on the committee concerned, the suggestions are adopted. Otherwise the matter will be finally disposed of by the Commanding Officer. It should be noted here that the execution of any change adopted at the suggestion of employees, rests solely with the management, the function of the council being of a suggestive or advisory character and not executive.

The Sub-Committees of the Council

Insofar as possible the Central Council and its sub-committees are relieved of the necessity of considering matters which are purely of departmental concern, such questions being generally settled by the employee representatives of each division in conjunction with the officer or civilian in charge. The arsenal has been divided into 13 divisions, including approximately equal numbers of workers. The 13 departments are as follows:

Engineering Division,
Purchase, Storage and Transportation Division,
Construction and Maintenance Section,
Administrative Division,
Small Arms Section,
Equipment Section,
Harness Section,
Woodworking Section,
Cloth Section,
Tool Manufacturing Section,
Artillery Vehicle Section (Shops I and G),
Artillery Vehicle Section (Shop E),
Artillery Vehicle Section (Shops L and M).

Employees Have Not Raised Own Wages

The 12 standing committees of the Central Council are shown in the following list.

(Continued on page 1369)

DOMINION STEEL CORPORATION

British Interests Said to be Planning Large Construction Program

Some strange statements concerning the Dominion Steel Corporation's Sydney, Nova Scotia, plant are made in a cabled report from London to Montreal newspapers. Col. Grant Morden of London is quoted in one cable as saying that British engineers, after a complete survey of the steel plant at Sydney, have reported in favor of "scrapping nearly all of it" as it was very out of date, and they recommend the installation of a new plant at a cost of between "two and three million pounds."

It is understood that British interests have taken 50,000 shares of the company's treasury stock, or 10 per cent of the consolidated capital of the Dominion Steel Corporation, this investment being estimated at \$3,500,000. *Iron and Steel of Canada* comments as follows on the London cablegram referred to above:

One hardly knows what to make of such irresponsible statements. No new steel plant can be built for "two or three million pounds." Further, the Dominion Steel Corporation has just put its plant in very good shape, and the only really weak link in the plant is the rather out-of-date and inadequate open-hearth plant. The blast furnaces are in good condition. The coke ovens and washery are new, and the best of their kind, and it must be a cold douche to trusting, not to say credulous, holders of steel stock to hear that after spending so many millions on the extension and rehabilitation of the steel plant, it "is very much out of date" and should be "nearly all scrapped."

The place where the Dominion Steel Corporation now needs to spend money is not on its steel plant (which is in better shape than it ever was in its history), but on the collieries, on which practically nothing has been expended since 1912.

The Dominion Steel Corporation has made lots of steel in the past, and good steel. Why should it be thought proper for British engineers, or any other kind of engineers, to inspect a going plant, which recently made a lot of money, and nonchalantly announce that the aforesaid plant is a junk pile? It is a wonder the term a "streak of rust" was not used. It is a favorite expression of outside engineers when inspecting Canadian steel plants.

If the Dominion Steel shareholders presently wake up and ask who is running their affairs it will not be surprising.

In the London report cabled to Montreal it was stated that when the new Dominion plant is built it would have great possibilities in export trade as well as home trade; that for years there would be a shortage of steel and of ships; that if the Canadian Government assisted shipbuilding with a subsidy the company would build ships.

Canadian Orders Go Begging

TORONTO, Dec. 22.—There are firms in Canada, many of them, that cannot get a mill to take their steel orders at all. There are orders going begging, especially for sheets that in ordinary times would be keenly solicited. One Canadian buyer for large importing and warehousing interests returned this week and confessed that he had failed in his mission. "It looks to me as though the United States mills did not want to take on business now. In one case the bookings were not over three months, but one of the officials at that mill told me that they did not intend to repeat the mistake of the war, when they booked for months ahead at stated prices. From that I take it that they are keeping their bookings at present prices within reach so that they can take on business at the higher levels that they look for when the spring rush comes."

Nearly all the Canadian machine tool dealers have been served by their United States principals with notices of increases in price, generally of the 10 per cent variety. The president of one of the largest Canadian concerns stated to *THE IRON AGE* this week that the increase in price and the exchange rate made it a pretty stiff proposition to buy in the States, but he was not aware that it was holding back any business. "The big thing now is delivery," is his opinion, "and the

buyer at present seldom haggles over the price if we can secure what he wants at anything like a reasonable delivery date. The chief difficulty is in keeping our customers who have received quotations from us informed of the changes. There should not be much worry over the exchange," he concluded, "as prices are based on delivery dates, and the exchange rate may have righted itself considerably by that time."

Experienced Chemists and Salesmen Seek Positions

The Employment Bureau of the United States Army Chemical Warfare Service is rapidly reducing its force and among those who will soon be thrown out of employment are 24 chemists experienced in analyzing iron and steel and about a dozen iron and steel salesmen. Major Frederick M. Crossett, director of the Chemical Warfare Service Employment Bureau, has been touring industrial centers in connection with the placing of some of these men. In speaking of the type of man in the Chemical Warfare Service during the war, many of whom are still seeking positions, Major Crossett said: "There were consulting chemists who abandoned the businesses they had spent years in developing. There were in addition men who held high salaried positions in the arts and in industry. There were 1400 chemists who worked in the experimental laboratories at Washington. They were the men who discovered the secrets on which the Germans relied when they set out to win victory through the use of gas." The address of the Employment Bureau of the Chemical Warfare Service is Washington.

International Steel Corporation

The word "American" has been dropped from the name of American International Steel Corporation, which will hereafter be known as International Steel Corporation. It was found that the name of the American International Steel Corporation, which is one of the group of companies operating under American International Corporation ownership, was sometimes confused with that of the parent corporation, and the change was for this reason, as well as for the convenience of the shorter name. The International Steel Corporation's business has mounted steadily, despite the unfavorable conditions which have tended to restrict the industry; and the year is closing with millions of dollars' worth of unfilled orders on its books.

Its original offices with the parent corporation at 120 Broadway have been outgrown and it has leased the entire floor of the Emigrant Industrial Savings Bank Building at 51 Chambers Street, where it will occupy new quarters about Feb. 1. The Allied Machinery Co. of America, another subsidiary of the American International Corporation, also has its offices in the same building.

Among other companies in the A. I. C. group are G. Amsinck & Co.; Carter, Macy & Co.; Rosin & Turpentine Export Co., and American Balsa Co. The American International Corporation also has substantial investment interests in International Mercantile Marine, United States Rubber Co., Pacific Mail Steamship Co., United Fruit Co., and New York Shipbuilding Co. One of its achievements is the construction and operation of the Hog Island shipyards. It also has a number of large projects under way in foreign countries. The directorate includes many of the best-known financial and industrial leaders in this country. Charles A. Stone of Stone & Webster is president, and Frank A. Vanderlip is chairman of the board.

The directors of International Steel Corporation are all identified with the parent corporation. The president is C. A. Richards, whose services were invaluable to the War Trade Board during the war. Morris Metcalf is executive vice-president, and Albert C. Mann is vice-president in charge of purchasing and traffic.

The Chaplin-Fulton & Mfg. Co., Pittsburgh, is building an addition to its plant in that city.

TYPES OF END STANDARDS*

Relative Value of Flat, Cylindrical, Spherical and Other End Standards

The term end standard is used to designate a standard of measurement the gaging dimension of which is the distance between the two ends, in contradistinction to the line standard on which a dimension is represented by the distance between two lines. The test pieces which accompany micrometer calipers are end standards, and the familiar 6-in. rule is a line standard.

Precision Gages and Flat End Standards

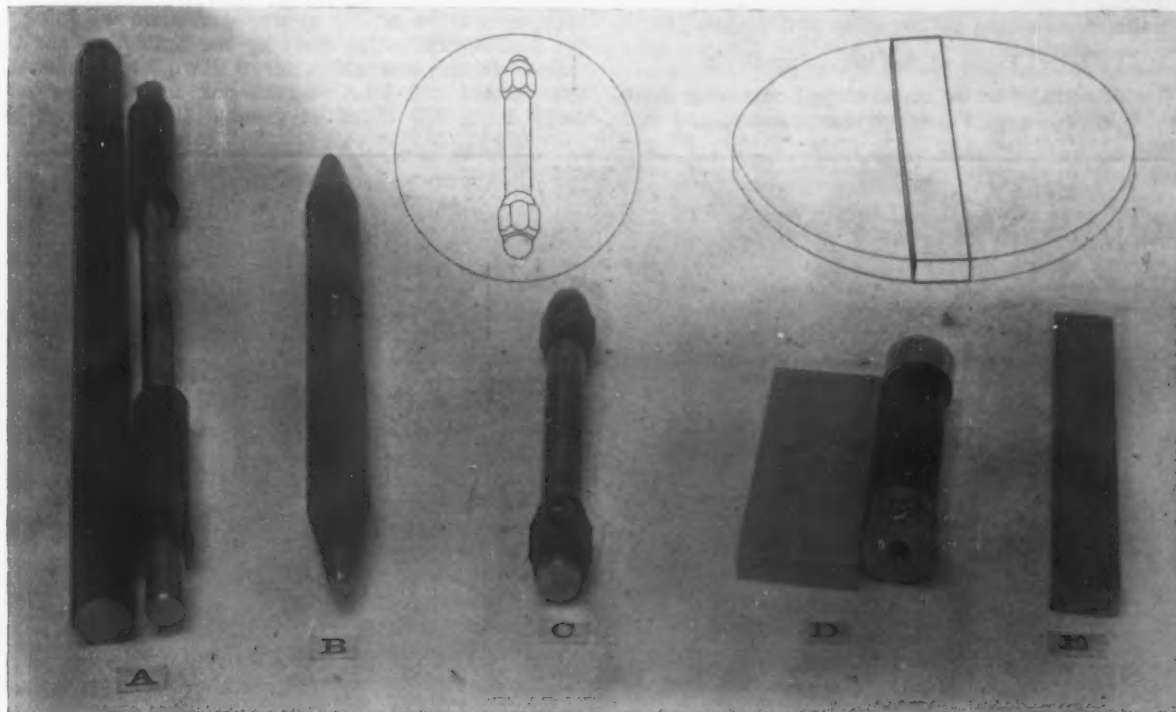
Precision blocks or gages are end standards, but there is seldom any question as to whether precision or another type of end standard should be used for a given piece of work. They are used generally for comparatively small measurements in combinations that give the exact size desired. They should be accurate to 0.00001 in., with sufficiently large gaging surfaces to insure stability when they are wrung together, without being so large as to be awkward in use. Such blocks cannot be made by the average manufacturer for his

This can be done on a measuring machine supplied with ball contacts, or with a micrometer caliper if sufficient patience is exercised. Nevertheless, the two following types require less time for the same accuracy.

Cylindrical and Spherical End Standards

Cylindrical end standards, Fig. E, have end faces which are portions of the lateral surface of a cylinder. If a reference measuring disk is cut through at equal distances each side of the center, a cylindrical end standard is left. Cylindrical end standards also can be made by the manufacturer for his own use. They possess an advantage over flat end standards, in that it is comparatively easy to align a gage in one direction only. They are used exactly as disks are used for the smaller sizes. These standards are found to be surprisingly rare, considering their general desirability.

Spherical end standards, Fig. C, occupy the same relation to steel balls that cylindrical end standards do to disks. The end surfaces are spherical with radii equal to half the length of the standard. They are the easiest end standards to handle when it comes to the larger sizes, because no attention need be paid to their alignment, so long as contact is secured



Flat, Pin, Spherical, Precision and Cylindrical End Standards

own use, and should be purchased from a reliable firm. Fig. D shows two types of precision gages.

Whereas precision blocks require special methods and skill in their manufacture, flat end standards of the usual type, Fig. A, can be made by a manufacturer for his own use. The end faces of an ordinary flat end standard are likely to be 0.00005 in. out of flat, and they are frequently out of parallel. The chief objection to flat end standards, however, is the trouble experienced to get them properly aligned. This materially limits the accuracy attainable with flat end standards over 6 in. in length, for it is difficult to "feel" whether a standard of greater size is in proper contact with the flat measuring surfaces of a measuring machine.

An imperceptible deviation from the proper alignment will give a reading diagonally through the standard which is considerably greater than the true length of the standard. Thus, if a 12-in. flat end standard is turned only 10 min. from its proper position, an error of somewhat over 0.0009 in. will result. Consequently it is difficult to repeat readings closely.

*By R. L. Rankin, assistant physicist, Bureau of Standards, Washington.

somewhere on the spherical ends. The radii on the commercial standards are usually ground with sufficient accuracy to give very similar measurements for different positions of the standard. The chief disadvantage is the difficulty of producing them in the average shop. Another disadvantage, due to the fact that point contact is obtained between a spherical and a flat surface, is that if the standard is used for a while in about the same position, it is worn away at that point so that a larger measurement is obtained for any other position. The effect of compression caused by pressure on these standards should be considered also for precise work.

Pin Gages Not Accurate

Pin gages, Fig. B, are not accurate enough to warrant their use if any other type will do. They are ground with a small radius and the larger sizes are sometimes flattened slightly on the ends. Readings change so, with the gage in different positions, that it is almost impossible to tell just what dimension the standard truly represents. If it is necessary to gage a groove into which only a small standard will go, it would be better to make a cylindrical or a spherical end

standard and taper the ends down to the desired size, rather than use a pin gage as commonly made.

One point which has not been mentioned is important in connection with all end standards, excepting new and reliable precision blocks. This is the calibration of the standards by the comparison of their length with that of known standards of length. It rarely happens that even a well-made end standard is accurate as to length. The average error in the length of 100 flat end standards tested recently by the Gage Section of the Bureau of Standards, ranging in size from 1 to 24

in. was 0.00032 in., and the average error in 40 spherical end standards was found to be 0.00024 in. The average manufacturer would make standards with considerably larger errors than these. Thus it is advisable to have at least one set of reference standards tested at the Bureau of Standards if a manufacturer is engaged on accurate work. Such tests are made for a nominal fee. As indicated above, this should not be necessary in the case of new precision blocks made by a reliable firm.

Electrically Driven Reversing Rolling Mills

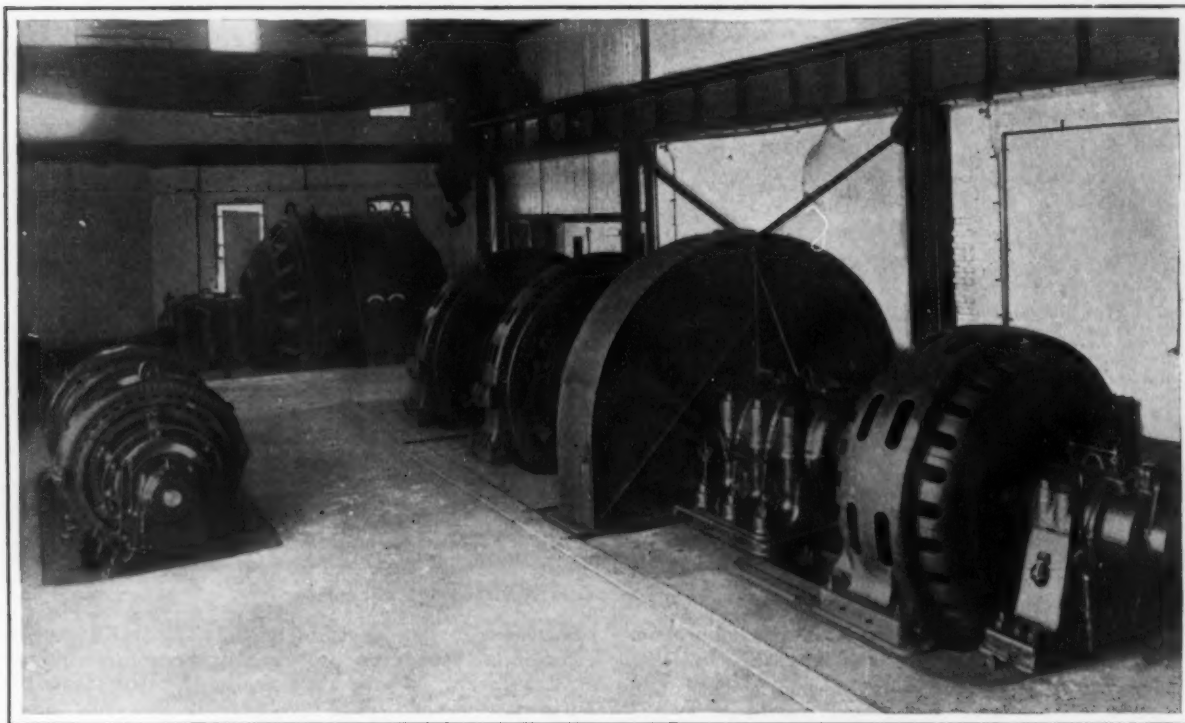
Essential Equipment and Its Functions—Power Problem
of the Plant as a Whole—Electric vs. Steam Drive

AN interesting discussion of electrically driven reversing rolling mills was given by Wilfred Sykes, Westinghouse Electric Mfg. Co., East Pittsburgh, Pa., before the sixteenth general meeting of the American Iron & Steel Institute, New York. After briefly reviewing the factors that lead up to the development of the electric drive for rolling mills, Mr. Sykes outlined the necessary equipment and the functions of the various units.

Principal Parts of the Reversing Drive

The principal part of an electrical reversing drive, he said, is of course the motor connected to the mill.

The motor is not supplied with energy direct from the power plant, but through a so-called "flywheel motor generator set." The function of this set is to provide means for controlling the speed and direction of rotation of the motor and of equalizing the load on the power plant. It would be, of course, very difficult to build any type of controlling equipment that would handle the large current involved in motors of this type, as will be readily appreciated when we think of the flashing and noise made by the controllers for the motors driving the tables, screw down, etc., which seldom exceed 100 hp., whereas our main motor may carry loads 100 times as great. The speed of the



The Reversing Mill Motor, Seen in the Background, Is Supplied with Current Through the Flywheel Motor Generator Set Which Provides a Means for Controlling the Speed and Direction of Rotation of the Mill Motor, and of Equalizing the Load on the Power Plant

These motors are direct current machines and differ little in general characteristics from those with which we have been long familiar. There are, however, many special features that play a most important part and that spell the difference between success and failure. Of first consideration must be the mechanical construction and this must be beyond question. We must make a closer study of the details of construction than is usual to insure there can be no relative movement of parts under the severe shocks that the motor has to stand, and prudence requires that all parts be so strong that in case something must break about the mill it will not be the motor. Together with this, we must keep our design balanced so that the weights of our moving parts are not excessive, as an appreciable amount of energy is required to accelerate and retard the motor itself.

motor is proportional to the voltage impressed on it, and its direction of rotation depends on the way the current flows through it. By having a special generator to supply the motor we can through the excitation of this generator vary the voltage and the direction of the main current, and we need handle only about $\frac{1}{2}$ of 1 per cent of the current in the motor. This is, of course, easily done, and the control of our 10,000 to 20,000-hp. motors is actually better than the control of the table motors.

The second function of our flywheel set is to prevent the terrific peak loads from the mill from being thrown on the power plant. If this were not done it would be necessary to have large generating capacity running at very low average load to carry the mill. Fortunately, we can equalize the load to a great extent by a properly controlled flywheel which will give up

energy during periods of great demand and absorb it during the intervals. For this reason suitable flywheels are connected to the generators supplying power to the reversing motor and through the aid of suitable controlling apparatus they are utilized so that the load on the power plant is only about one-fourth of the peaks on the main motor.

For driving the generator and flywheel some kind of motor is required, and the type is dependent on the power system. This motor is only large enough to carry the average load, is not connected with the peaks of the mill motor. The remainder of the equipment is for the purpose of controlling these functions and providing means for measuring and recording the power used. The starting and the control of the speed of the motor driving the set is done by the slip regulator, which automatically slows down the flywheels during peak load, thus causing it to give up energy and accelerates it during intervals, thereby absorbing energy.

This may seem a rather roundabout system, but it functions admirably, and it does more than a steam engine, inasmuch as it equalizes the load which is of the greatest importance from an economic standpoint.

Electric vs. Steam Drive

As to the first cost, the reversing motor and equipment is a little more expensive than a high class engine, all factors considered, but the fuel required does not exceed one-third of that for the average engine and is less than one-half of that for the best engine we can build. Such items as labor, maintenance, etc., are small, so that altogether it shows great economy compared with steam drive.

We are accustomed to associate a considerable boiler plant with a reversing engine and it is rather interesting to find that with electric drive the power taken by the reversing motor, compared to the mill auxiliaries, is not greater than it is. A five months' average of one plant shows that the main blooming mill equipment took only two and one-fourth times the power required for the auxiliaries of the same mill.

This brings us to one of the most important factors in considering electric drive, and that is we must consider the power problems of the plant as a whole.

Contracts of Gray & Davis, Inc.

Gray & Davis, Inc., Cambridge, Mass., announces that it has closed a contract for 10,000 additional starting and lighting systems with the Chandler Motor Car Co., and that this department of its business is to-day operating fully 50 per cent larger than ever before in the history of the organization. The Paige-Detroit Company has placed an order of similar size with the concern, and the company's French agency has sent in an initial order for 6,000 systems.

The daily output of the company is running from 450 to 500 systems, and the management hopes to increase this to 550 by Jan. 1. The first shipment of the company's unit car has been made to the Butler County Railway Co., of Missouri, and others will shortly follow. The showing of Gray & Davis, Inc., is attracting considerable attention throughout New England. Its recovery from financial difficulties within a comparatively short period has been most remarkable.

The Toledo Steel Products Co.'s New Plant

The Toledo Steel Products Co., Toledo, Ohio, until recently the Lewis Steel Products Co., will move from its present location on Detroit Avenue to its new plant on Summit Street and the Maumee River on or about Jan. 1. This company is the outgrowth of a small business organized in the early days of the automotive industry by George Lewis, pioneer manufacturer of poppet valves. Later the Lewis Electric Welding Co. merged with the Lewis Foundry Co., and the two became the Lewis Steel Products Co. In January, 1919, Mr. Lewis disposed of the business to A. R. Clas, who until that time had been in charge of the management

It is not reasonable to take a part of a mill and make comparison of cost of electric versus steam drive, especially where the steam plant may be an isolated unit, as we unduly load the electric motor with a part of the generating plant out of proportion to the real facts. It is where we consider the plant as a whole that the electric system demonstrates its value. For economy we must concentrate our power equipment so as to utilize the best that science provides us with. By using large units the greatest economy is obtained and the relative labor and other costs are reduced to a minimum. If we then connect to such a power generating station all our power consuming devices we will find that the aggregate required is less than the sum of the loads on the individual consumers.

Electricity provides us with a means of using the most economical prime movers, and the consuming devices can be driven with machines that will transform our wholesale generated power to mechanical work with a loss of only a few per cent. We not only convert more of the heat units in our fuel into useful energy, but we can arrange to take advantage of the overlapping of the fluctuations of the demand of our consuming devices to average them and so keep the rate of generation approximately constant.

We should lay out our generating stations with units of such size and characteristics in relation to the ultimate requirements as to get the best economy and with such a margin of capacity that the electrification of our plants can take place as opportunity offers, without having to consider each time we desire to add a motor whether the generating plant will not have to be extended. We can then modernize our mills as changes are required and ultimately convert our wasteful methods of power generation of the past to the best that we have at present knowledge of. Great force is given to this viewpoint with the rapid rise of fuel and labor costs, two of the principal factors in our power costs. It is wise in this respect to consider the possibilities of ultimately tying different generating stations together for the material benefit of those concerned. In this way, power may be interchanged at times to advantage and the stand by value of such interconnection reduces the amount of spare plant required with the consequent savings.

of the Falls Motors Corporation of Wisconsin. Mr. Clas has associated with him as assistant general manager J. George Lude and as factory manager W. P. Childs, both of whom had also been identified with the Falls Motors Corporation. Since the start of the year 1919 considerable additional equipment has been installed and production correspondingly increased, but on Sept. 18 ground was broken for a new plant, which will be complete in every detail. The building includes a foundry, power and boiler rooms, departments for cleaning, inspecting, and annealing, a plant for threading and cutting steel, and a machine shop including a tool, screw machine, grinder, and inspection department. The plant will have a capacity of between 50,000 to 60,000 poppet valves daily, and the company will employ from 500 to 600 men and women.

Robert W. Hunt Prize to Be Awarded Annually

At the fiftieth anniversary dinner of the Western Society of Engineers, held at Hotel Morrison, Chicago, on Dec. 2, it was announced that \$5000 had been set aside by Robert W. Hunt, president, Robert W. Hunt & Co., Chicago, the income of which will constitute a prize to be awarded annually for the best paper presented before the society on the manufacture of iron and steel. Three prominent engineers will pass on the papers, one of whom must be a recognized authority in the iron and steel field. If no paper is considered worthy of the prize, the income from the fund for that year will be given to St. Luke's Hospital, Chicago. In the event of no award in five consecutive years, the principal itself will be turned over to the hospital. Competition will be confined to club members 30 years of age and younger.

WORKS EMPLOYEE PLAN

Men Elect Representatives Who Meet in Conference With Superintendent

To provide a medium through which the employees may present grievances and suggestions, and the management a means of getting into close personal touch with the men, the Erie City Iron Works, Erie, Pa., recently effected an organization of its employees who select representatives to meet with the general superintendent and informally discuss any matters that may be of mutual interest.

The outstanding feature of this plan is that no attempt is made to give the men employees' representation, and in fact they were given clearly to understand at the start that the plan did not involve giving them any authority whatever. The company felt that the men doubtless had grievances that they were unable to get to the management through the foremen, that they were not inclined to state their grievances to foremen, that the foremen are so busy looking after production work that they do not have time to look after the troubles of the men, and that the men themselves would welcome any plan under which they would feel free to make their complaints known to the higher executives. Accordingly, in establishing this closer relationship the foremen are entirely eliminated, the management dealing directly with the men.

Employee Representatives Hold Conferences

Under the plan what is known as a men's conference is held with the general superintendent. The entire body of workmen elect their own representatives, about 25 in number. It was the company's aim to have a fair representation from each general line of work, but not from every one of the numerous trades employed. The representatives include men from the foundry, boiler, tank, engine, machine, pattern and carpenter shops, the number of representatives being fixed by the management, and not being arbitrarily apportioned according to the number in each department. The men selected meet in conference with G. Greig, general superintendent, who represents the company or board of directors.

When the plan was adopted, the plant was shut down for an hour and the 800 employees were called together. The first vice-president acted as chairman of the meeting, and introduced Mr. Greig, not because an introduction was needed, but to give him an opportunity to emphasize to the men that Mr. Greig represented the company, that the company stood back of any plan he proposed, which was fully approved by the management, and should be considered just as official as if it were presented directly by the board of directors. Mr. Greig, in outlining the plan, explained that he had not called the men together to discuss industrial democracy, but to provide means by which they could present officially any grievances or suggest changes, or other matters to the company. He told the men that to get the organization started he would divide the plant into departments and would suggest the number of representatives to be chosen from each department, which could be changed later by the men should they so desire. The only positive restriction he made was that no man should be elected a representative who had not been an employee of the company for a year. After the plan had been fully explained, it was left to the men themselves to decide whether it had their approval, and the two officers left the room while it was being discussed. Then a vote was taken and the men unanimously endorsed the plan.

The company did not concern itself as to how the representatives were chosen, leaving that matter entirely in the hands of the men, who in most cases made good selections, although a few were elected who were somewhat inclined to radicalism.

Superintendent Represents Company at Conference

The men's conference, which is now being held regularly, is devoid of formality. The superintendent is the only officer of the company present; foremen are strictly barred. The time is spent largely in making

suggestions, many of them of benefit to the company regarding unsafe conditions, changes in the work, etc. Of course, there are quite a few complaints, but one object of the conference is to bring these out and eliminate if possible the causes, if the complaints are justified, and quickly check any dissatisfaction among a limited group that might eventually lead to unrest throughout the entire plant. Men are not allowed to talk about or find fault with the foremen. If the man has a grievance against a foreman, he must go to his foreman first and give him a chance to straighten the matter out. If he is unsuccessful, he can then take the matter up at the conference. It is believed that the foremen will be more inclined to listen to the man's complaint and give him a square deal when he knows that the man can take a grievance up at the conference.

The conference gives the superintendent an opportunity to talk to the men on efficiency, Americanization, and other subjects of mutual benefit, but he avoids saying anything that might give the employees the impression that the company is trying to get something out of them. The men at first were not inclined to talk, but the superintendent got them started in the discussions by asking questions, and they now talk quite freely.

A record is kept of the main points brought out at the meetings, and copies of these, with the names omitted, are posted in all the shops soon after the sessions, so that the employees may know what was discussed. Representatives of the men are advised that they are free to take up any matter individually with the superintendent at any time, so that they have full opportunity to be heard if they are backward about taking up certain topics in open meeting, and advantage is being taken of this opportunity. The men in one department got to talking over the company's business, and concluded that labor was not getting its full share. A representative went to the superintendent and said in effect: "Labor is paying so much for making this product, material costs so much, and the company sells it at such a price, making as a profit the difference between the selling price and the combined cost of labor and material." In reply the superintendent carefully explained to the man the various items that must be added to the bare cost of labor and material, such as overhead, selling costs, etc., in figuring the selling price. The man went away satisfied.

Foremen Have Separate Meetings

The men's conference is held every two weeks, and on alternate weeks the foremen hold a meeting. At the foremen's meetings the superintendent brings up matters that come up at the men's conference that he wishes to discuss with the foremen. The men's conferences, which are held during working hours, are well attended, an average of 80 per cent of the representatives being present, or 92 per cent excluding representatives who are absent from work at the time the conferences are held. The men's conferences have been going on about four months, and the company finds that the feeling that the men now have that they are provided with an avenue through which they can get to the executives has resulted in an improvement in the spirit of the employees, less unrest, better work and less labor turnover. The latter item, which was high before the inauguration of the plan, has been reduced 20 per cent, and the company believes that this reduction is largely due to the establishment of the men's conference.

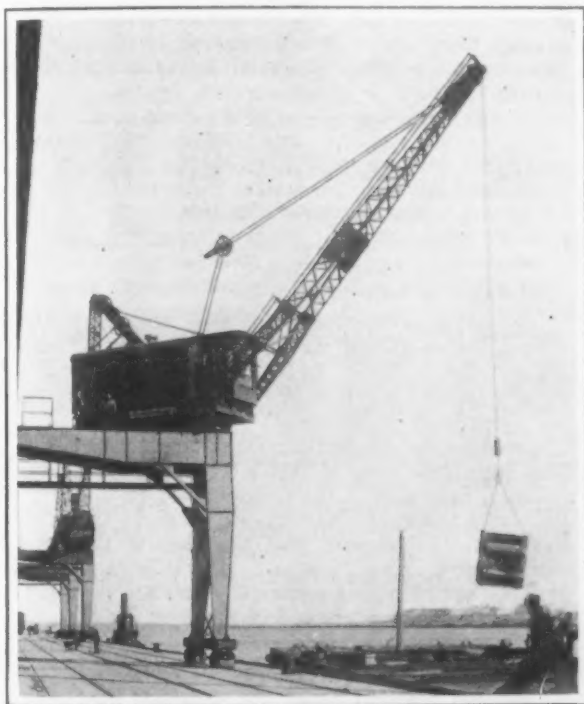
The British military governor in the section of Cologne reports that for the last few months prospecting for iron and manganese has been taking place in the Idarwald, about thirty-five miles south of Coblenz. It was known before the war that there was iron ore in this region, but with the Lorraine iron fields in their possession, the Germans did not consider the exploitation of the deposits in the Idarwald profitable enough. Deposits have been discovered in the regions of Rhauen-Sulzbach, Weitersbach, and Horbruch. The ore lies at a depth of 6 to 10 ft., but in several places also just below the surface. It contains from 55 to 60 per cent metal, and up to 30 per cent manganese.

DOCK CRANES OF NEW TYPE

Supported on Semi-Portal Bridges—Handle Large Tonnage at Army Supply Base

A new type of dock crane to handle freight to and from ships has been brought out by the Wellman-Seaver-Morgan Co., Cleveland, and four of these cranes have been installed at the Army supply base, South Boston. This is said to be the most complete plant in the country for handling merchandise for ocean transportation. Its construction was started during the war for handling Government shipments to France, and it is used now by both the Army and Navy, but it is fitted for commercial work, and it is expected that the plant will be used eventually for handling regular commercial shipments from Boston.

The Army section of the terminal includes an eight-story warehouse, 638 ft. long, and a two-story wharf shed of the same length and 100 ft. wide. These two



An 8000-Ton Vessel Can Be Loaded with These Four Semi-Portal Bridge Cranes in 55½ hr. The cranes have four motions, bridge travel along the wharf, trolley slewing, boom hoisting or luffing, and load hoisting

buildings are parallel, and between them are railroad tracks and a roadway for trucks. The second floor of the wharf shed and the third floor of the warehouse are connected by six bridges. Between the water and the wharf shed is a space 35 ft. wide, occupied by a landing platform carrying two railroad tracks from which freight is delivered to or received from the boats. The four cranes that span the landing platform handle freight either to or from this platform, a gallery on the second floor of the dock shed and the boats. The Army warehouse was built to store merchandise to be held for some time. This is served by 24 elevators of 10,000 lb. capacity. Merchandise is transported from the warehouse to the wharf shed with electric tractors and trailers. The section of the base operated by the Navy comprised two three-story freight sheds, each 924 ft. long and 100 ft. wide, connected by four bridges spanning three depressed tracks.

The Wellman-Seaver-Morgan cranes that span the landing platform consist of a traveling semi-portal bridge which carries a rotating frame work that supports a luffing boom at its forward end. The bridge runs on two rails, one located near the face of the wharf, and the other supported on brackets carried on the side of the wharf shed. The crane has four mo-

tions, the bridge travel along the wharf, trolley slewing, boom hoisting or luffing, and load hoisting. The mechanism is so arranged that the motion of either hoisting or luffing can be operated simultaneously with both rotating and traveling motions. All motions are under the control of the operator located in the cab on the rotating carriage. The cranes are so designed that additional drums can be added for the operation of two rope grab buckets. Current for operating all mechanical equipment is delivered at 13,800 volts, and transformed to 2300 volts at the sub-station for distribution about the plant, being further transformed at various points for lighting and power. Direct current at from 230 to 250 volts is supplied for use in the cranes and dock winches by two 500-kw. rotary converters. Each crane is rated to handle 8000 lb. at a distance of 29 ft. and 5000 lb. at a distance of 52 ft. from the center of the rotating carriage. The principal dimensions of the crane are as follows:

Horizontal span, center to center of runway rails	26 ft. 5 in.
Maximum reach of boom from face of capshell	44 ft.
Angle through which boom may be slewed	360 deg.
Top of wharf rail to top of shed rail	26 ft. 7 in.

In designing the semi-portal bridge supporting the operating mechanism 100 per cent was added to all live loads to allow for impact. In addition, allowance was made for the swaying of the load. A steel casting track ring is bolted to the deck of the bridge for supporting the revolving super structure. The inside of this track ring is arranged to carry a circular rack for the slewing motion. Concentric with this casting is a hollow center pivot pin, the lower end of which is held by cross framing between the main girders of the semi-portal. The bridge dock is covered with checkered steel plate, and hand railings are provided.

The wharf end of the crane is carried by two cast-steel equalizing trucks, and the opposite end is carried on the shed rail by two wheels, one at each corner. The track wheels are double flanged, and those on the shed rail have extra wide treads to allow for expansion or contraction, as well as any ordinary misalignment of the two lines of rails. The motor for propelling the crane along the wharf is secured to one of the girders of the bridge, and is connected to half the wheels on each track through spur and bevel gear reductions. The base frame carrying the hoisting and slewing mechanisms is of rolled steel shapes and plates well braced. It is carried on six steel rollers, four in front where the heaviest loads occur, and two in the rear. Those in front are equalized to distribute the loading evenly, and all are spaced to operate on a circular track 9 ft. 4 in. in diameter.

The lower end of the boom is bifurcated and pin-connected to the base frame at each side of the operator's cab, this arrangement giving the operator a clear view of the load. The operator's cab contains only the master controllers, brake and clutch levers and the protective panel. The hoisting, luffing and slewing mechanisms, as well as control switchboards and resistors, are in the machinery house. The hoisting and luffing mechanism consists of two winding drums connected to a motor through suitable gearing and clutches. Spur gearing is used in the hoist mechanism while the final reduction of the luffing mechanism consists of a worm and gear. The pitch of the worm is such that no mechanical brake is required to prevent the load from lowering. The entire unit is mounted on a cast-iron bed plate. The slewing is accomplished by a motor operating through a train of spur and bevel gearing and a pinion meshing with the circular rack, attached to the bridge.

The electrical equipment includes a 65-hp. motor for hoisting and luffing, a 15-hp. motor for slewing and a 25-hp. motor for bridge travel. The motors are of the mill type. The hoist and traveling motors are each equipped with a selenoid brake mounted upon the armature shaft extension. The cranes are completely equipped with improved safety devices. Hyatt roller bearings are used throughout.

With the facilities provided, it is estimated that 200 carloads, 6000 tons, can be unloaded from freight cars and put into storage in the warehouse in a 10-hr. day,

or 4200 tons unloaded from cars and placed in storage in the lower story of the wharf shed in the same time, and an 8000-ton vessel can be loaded with the bridge

cranes in 55½ hr., but it is stated that the cranes in actual service show a considerably higher unloading speed than this estimate.

World's Output of Electric Steel and Pig Iron

Producing American and Foreign Electric Furnaces
in Six Years—Progress in Electrically Made Pig Iron

—BY W. H. FITCH*

THERE have been various estimates of the world's output of steel and pig iron from electric furnaces, but only very recently has it been possible to collect reliable data showing the remarkable strides made in the six years previous to 1919. Statistics from the various leading countries having such furnaces have been very slow in reaching the public, especially figures that could be relied upon. Not only has the war interfered but such information has not been collected in some countries until lately.

In the following a study is given of statistics from many sources coming to this country in the past year at various times and a compilation has been made which is believed to represent in a fairly correct way a record of this industry. The less important producing countries have not been considered.

Electric Steel

As to steel the following table gives the output of electric steel ingots and castings in the leading producing countries from 1913 to 1918 inclusive, 1914 being omitted as of less importance:

World's Output of Electric Steel from 1913 to 1918					
Country	1913	1915	1916	1917	1918
United States	30,180	69,412	168,918	304,543	511,364
Germany	101,755	131,579	190,036	219,700	221,824
Great Britain	22,000	49,256	120,600	147,922	
Canada		5,625*	30,053	50,467	120,000†
Austria-Hungary	26,837	23,895	47,247	47,152	41,163
France	18,000	21,000	35,000†	54,000	58,000
Italy		22,387	22,376	36,948	40,000†
Sweden	5,661	5,582	6,648	10,664	15,000†
Totals	182,433	301,480	549,534	844,074	1,155,273

*61 tons in 1914. †Estimated.

The extent of the expansion of this industry as a whole is represented in the totals for 1913 and 1918. In 1913 five countries produced 182,400 tons, while in 1918 eight countries made 1,155,200 tons in electric furnaces or over six times the 1913 output. The same countries which produced 182,400 tons in 1913 are credited with 837,300 in 1918 or 4½ times as much.

The expansion with each year varied. The total output in 1915 was 65 per cent more than in 1913, while in 1916 it was 80 per cent greater than in 1915, this being the highest percentage. From 1916 to 1917 the increase was 300,000 tons, or 55 per cent, and from 1917 to 1918 the growth in output was about 37 per cent.

One of the most striking features of this compilation is the relative growth of the American and German electric steel industries. In 1913 Germany led the world and produced over 50 per cent of all the electric steel then made. In that year the United States had only just started, although it ranked second. The German-speaking countries, Germany and Austria-Hungary, were credited with about 70 per cent of the world's output in that year. In 1918, however, a different story is told. While Germany had a little more than doubled her electric steel output in six years, the United States had increased its production 17 times and easily led all competitors. Its output was not only twice that of the two German countries referred to, but it was not far from half of the total production of the world.

Other comparisons and deductions are possible, that may be left to the analysis of the individual reader. Attention should be called, however, to the rapid development in two other English-speaking countries, Great Britain and Canada. In four years both greatly increased their respective outputs of electric steel, the former nearly 7 times and the latter 21 times.

Two kinds of pig iron are made in electric furnaces;

one, and the more important, is that made direct from the iron ore. The other has been termed synthetic iron or pig iron made from steel scrap in electric furnaces; of this fairly large quantities were made during the war.

Electrically Made Pig Iron

The two leading countries in the electric smelting of iron ore have been Sweden and Italy, while Canada and France have probably surpassed all other countries in the making of pig iron from steel scrap. Data regarding these materials are not easy to obtain, but the following tables have been compiled as being the latest available:

Electric Pig Iron from Iron Ore—Tons.				
	1915	1916	1917	1918
Sweden	35,075	44,782	65,059	.....
Italy	3,800	17,298	56,524	.....
Norway	8,742*	.....	.....	.....
Synthetic Pig Iron				
Canada	.....	.....	13,691	30,425
France	.....	150,000	.....	.....

*160 tons in 1913

Considerable synthetic pig iron was made in the United States during the war, but data as to quantity are not obtainable. There has been also some electrically smelted pig iron in California and Canada, but the quantity is indefinite.

Sweden has 12 electric smelting furnaces for pig iron from iron ore, of which 11 were operating last summer, according to the testimony of Prof. Joseph W. Richards, Lehigh University, who was in that country this year. He reports that the electric furnaces are surpassing the blast furnaces. Italy bids fair to further increase her output of electrically smelted iron, six new furnaces being now erected in northern Italy.

Manganese Ore in 1919

Reports received from the shippers by the U. S. Geological Survey, show that for the six months ended June 30, 1919, the shipments of high-grade manganese ore amounted to 44,539 tons. The shipments for the first quarter of 1919 were 23,937 tons and those for the second quarter were 20,602 tons. During the three quarters from October 1, 1918, to June 30, 1919, the shipments of high-grade ore showed a steady decrease. The number of shippers of high-grade ore during the first six months of 1919 was only 30, whereas the number for the year 1918 was 247.

The total shipments of low-grade ore containing 10 to 35 per cent of manganese for the six months ended June 30, 1919, were 86,158 tons.

Data on Manganese Ore

"Information Concerning Manganese Ore" is the title of a pamphlet printed for the use of the Committee on Ways and Means of the House of Representatives by the United States Tariff Commission. It contains valuable data on domestic production, foreign output, importations, prices and competitive conditions. There is an extended list of both shippers and purchasers of manganese ore.

A dry valve accelerator for use with Grinnell dry pipe sprinkler systems is announced by the General Fire Extinguisher Co., Providence, R. I. This accelerator is said to reduce by 85 to 90 per cent the time necessary for sufficient air to escape through the open head to allow the dry valve to trip.

COAL AND COKE PRICES

Restrictions Will Probably Not Be Lifted Until After First of Year

WASHINGTON, Dec. 23.—The present prospects are that the war-time price restrictions on coke and coal, which were reimposed by the Fuel Administration as the result of the strike, will not be lifted until after Jan. 1. The plan is to continue the prices in effect while the Railroad Administration continues to control distribution of coal. It is expected that within 10 days or two weeks conditions will have returned to normal to such an extent that the price and distribution control can be abandoned.

A peculiar situation exists with reference to the price control. The order restoring coke prices and the previous order relating to bituminous coal price was issued by Dr. Harry A. Garfield, while Fuel Administrator. Dr. Garfield did not delegate his price-fixing authority to the Railroad Administration, as he did in the case of the distribution of coal. Inasmuch as Dr. Garfield has now resigned and no successor has been appointed, there is no one except the President himself with authority to lift the price restriction. President Wilson's lack of close touch with the situation may make it necessary for considerable pressure to be brought to bear upon the White House before the price restrictions are taken off.

The Railroad Administration reports the conditions are slowly getting back to normal, although there have been great difficulties in getting empty coal cars back to their normal channels of traffic after the extraordinary dislocation during the coal strike.

Attorney General Palmer appeared before the Senate coal investigating committee in connection with his part in the settlement of the coal strike. The Attorney General insisted that the Government did not make any compromise, but that the miners had accepted its terms. Mr. Palmer denied that any inducement had been offered other than what had been specifically stated in the memorandum of agreements. Alfred M. Ogle, chairman of the executive committee of the Bituminous Coal Operators' Association, told the committee following the Attorney General's testimony that the operators had never agreed to accept whatever decision as to wage advances might be made by the commission to be named by the President.

President Wilson appointed as members of the commission Rembrandt Peale, representing coal operators; John P. White, former president of the United Mine Workers, and Henry M. Robinson, former member of the Shipping Board and now a member of the Industrial Conference which is in session in Washington. In a letter asking them to serve, the President says he will give them the authority of the Fuel Administration to control prices, if necessary.

Increased Furnace and Mill Activity in Youngstown District

Substantially improved fuel supply in the Youngstown, Ohio, district enabled district corporations to accelerate operations the week of Dec. 22. A majority of the plants will close only Dec. 25 for the holiday observance, resuming Friday morning. Three blast furnaces were started last week, No. 1 at Hubbard, Trumbull County, of the Youngstown Sheet & Tube Co., Mary furnace at Lowellville, Ohio, of the Sharon Steel Hoop Co. and No. 5 in the Haselton battery of the Republic Iron & Steel Co. Twenty of the 25 stacks in the Mahoning Valley are now pouring, total production averaging 10,000 tons every twenty-four hours. The active furnaces are—Youngstown Sheet & Tube Co., four at East Youngstown and one at Hubbard; Brier Hill Steel Co., two at the Brier Hill works; Carnegie Steel Co., six at the Ohio works; Struthers Furnace Co., one at Struthers; Sharon Steel Hoop Co., one at Lowellville; Republic Iron & Steel Co., four at Haselton, and the A. M. Byers Co., one at Girard, Trumbull County. The Republic Iron & Steel Co. expects to get its detached furnaces at the Mahoning Valley

works, Youngstown, and at New Castle, Pa., and Sharon, Pa., in blast as soon as fuel supply warrants. Brier Hill Steel Co. plans to blow in Grace furnace, idle for relining, about the first of the year.

Of the 63 open-hearth furnaces in the Valley, 55 were being tapped this week. The Ohio works of the Carnegie Company, registered the heaviest steel plant operations, with 14 of 15 open hearths producing. Brier Hill Steel Co. is operating 12 open hearths, Republic Iron & Steel, 10; Youngstown Sheet & Tube Co., 12, and Trumbull Steel Co., 7.

British Users of American Vanadium

Commenting on the formation of the Vanadium Co. of America in the United States. The London *Iron-monger* has the following to say:

It is only fair to say in connection with this matter that in the past British steelmakers have been considerably treated by the Vanadium Co., which, although even then holding a virtual monopoly of the supply of ferrovanadium, has never shown any disposition to take advantage of it by holding up supplies. On the contrary, throughout the war ferrovanadium was the only steelmaking alloy of importance of which the supply never failed, and the prices ruling in this country were generally lower than those in America. No attempt was made to use the abnormal war conditions to evade contracts entered into at peace prices. Notwithstanding the present rise in values due to a temporary shortage, the quotations here are lower than in America. British requirements of ferrovanadium are still covered for some months at prices substantially below those ruling in the open market, nor do any of the big users here anticipate that their interests will suffer from the transfer of the American Vanadium Co.

There has been no lack of initiative on the part of British and other European steel makers and metallurgists to secure additional and independent sources of ferrovanadium, but all these efforts have failed for the simple reason that no adequate supply of ores could be discovered. The mines owned by the American Vanadium Co. in Peru are unique, both as regards their extent and richness, so that governmental or any other action, unless it led to the discovering of an equally rich mine or an efficient substitute for ferrovanadium, would be quite futile. Up to the present time the search for vanadium ores which could be worked commercially have met with no success.

No More British Unemployment Donations

LONDON, Dec. 5.—The American Chamber of Commerce in London says that the cessation of the government unemployment donation to civilians on Nov. 24 has put a different aspect on the labor market. The Ministry of Labor anticipates a keen demand for work of any kind and a consequent decrease in unemployment. Some 95,000 civilian men and women must find work. As a matter of fact, the dole was paid to 135,000 people altogether, but of these 40,000 were metal working shop employees out of work because of the iron molders' strike, now in its eleventh week. It is anticipated that the women will again enter domestic service.

Although no longer available for civilians, the government's unemployment donation will continue until March 31, 1920, for demobilized service men and women. For this period a maximum of 9 weeks doles may be granted at the reduced rates of 20s. (nominally \$4.86) a week for men and 15s. (nominally \$3.65) per week for women, without supplementary allowances. Since the date of the armistice, says the American Chamber, 3,000,000 demobilized soldiers and sailors and 1,500,000 demobilized munition workers have been re-absorbed in the peace industries.

American Steel Foundries to Manufacture Auto Parts

The American Steel Foundries has added automobile parts to its list of products. Its Indiana Harbor, Ind., plant is now manufacturing disc steel wheels for automobiles and motor trucks, and a large plant now being constructed at Detroit will manufacture automobile springs. The spring and wheel plants will be in full operation on or before July 1, 1920, and their output will be handled by the American Auto Parts Co., a subsidiary of the American Steel Foundries.

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EDITORS:

A. I. FINDLEY

WILLIAM W. MACON

GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

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Arbitrate or Investigate

The employer class of Great Britain seems not to be united on the question of compulsory arbitration of disputes between owners and employees. Powerful influences are working against it and in favor of what are termed courts of inquiry, whose purpose would be to investigate any difference which might arise, and place the results before the public, including the employees affected. The advocates of this plan take the ground that no strike can endure in the face of public opinion. If the mass of people is against the owners, it is argued, they must give in to the demands made upon them; if against the strikers they must fail for lack of sympathetic backing. In the United States no law would be favored which did not aim to prevent strikes rather than to place responsibility after the strike had come. The Canadian plan makes illegal a strike or lockout until the points at issue have been investigated and the results made public. The New Zealand plan is compulsory arbitration in the beginning. No strike can occur, legally. In Canada a strike can occur, but not until the official investigation has been completed.

An editorial in a recent number of *Engineering*, London, asserts that in the bill now before Parliament for the establishment of industrial courts, the most important feature is that creating a court of inquiry to establish the actual facts of the case where a trade dispute either exists or is apprehended. The writer goes on to say:

The compelling effect of public opinion has been repeatedly exemplified in the past, notably so in the great strike of the dock workers some 30 years ago. So soon as the public realized the wretched status of casual labor at the docks, the success of the strikers was assured. The pressure of public opinion had again much to do with the ending of the recent railroad strike. The data published by the Government showed most conclusively that the men had little or no warrant for their action, and not all the ingenious special pleading of the men's representatives was able to weaken the conviction of the public that the lightning strike was justified neither by the present conditions of railroad labor nor its future prospects.

The average man in the main demands merely a square deal, and will yield to the pressure of public opinion if he can be assured that this is based on the actual facts of the case and not merely on plausible *ex parte* statements. It is of first importance, therefore, that machinery should be devised by which, in the case of differences between capital and labor, the community should be in a position to ascertain the actual facts about the question in debate. Indeed, we may go further and insist on the importance of the ma-

chinery for bringing home these facts to the rank and file of the workmen concerned. These are not always accurately stated by their representatives.

If the British law should be so framed that no dispute can legally go to the extreme of strike or lockout until investigation has been made officially and reported upon, there would be few strikes. The strike would cease to be a weapon. For all practical purposes the method would probably work as effectively as compulsory arbitration, which is the plan most generally favored in this country. According to the legal authorities neither plan could be adopted under the Federal constitution or the constitution of the States, excepting as applied to the public utilities and perhaps to those industries upon which the people must depend for the necessities of life. However, if either one of the systems were applied in this somewhat limited field the effect upon all industry should be to spread the doctrine of peaceful adjustment of labor troubles. There are many communities of the United States where arbitration was made compulsory under war conditions, and in every instance, so far as can be learned, the workers were entirely satisfied; and a great majority of them would be loath to resort again to a strike. If England sets the example much will be learned from the experience.

Record Rail Exports

Exports of American steel rails in 1919 thus far have broken previous records despite the well known international conditions adverse to foreign trade. The pre-war record was 460,500 gross tons in 1913. War demand caused shipments of 540,800 tons in 1916, or 45,000 tons per month, but this promises to be exceeded in 1919, exports being 563,900 tons to Nov. 1, or 56,000 tons per month, 11,000 tons per month above the 1916 rate. As in steel plates, to which attention was called last week, so in rails Japan is one of the heaviest buyers. In 1918 that country took 81,000 tons, or four times as many as in 1913. But to Nov. 1, this year, Japan is credited with 118,300 tons, or 11,800 tons per month, as against 7600 tons per month in all of 1918. France also ranks high as a buyer of American rails, the exports to that country having been 13,000 tons per month to Nov. 1, this year, as

against 14,300 tons per month in 1918. British South Africa had taken a total of 16,100 tons of American rails to Nov. 1, 1919, as compared with 4575 tons to Nov. 1, 1917, or an increase of nearly 400 per cent in two years. One explanation of the large call for American rails is that to Nov. 1, 1919, Great Britain had exported only 97,700 tons of rails, whereas to Nov. 1, 1913, British exports were 426,400 tons. Thus it appears that American rail exports in the first 10 months of this year have been nearly six times the British exports for the same period.

Foreign Exchange and Commerce

The situation as to foreign exchange has proved both puzzling and disheartening to American business. It is somewhat as if two men were trying to converse, each using a language the other did not understand. The bankers talk of "stabilizing" exchange and many business men assume that this means the restoration of exchange rates to approximate gold parity. Such an undertaking naturally appears so chimerical, at least for any time in the near future, that no serious interest is taken.

Stabilization, however, does not necessarily mean the restoration of former rates, which were based on the relative gold value of the currency units. These rates have become hypothetical, since they always assumed that gold could be moved to equalize the slight divergences that used to occur, and at present there is no gold to be moved between Europe and this country. The European countries are not on a gold, but on a paper, basis. Even in England gold is at about 22 per cent premium. If the thing could be done, therefore, there would be no particular merit in putting the international exchange rates at gold parity.

Fluctuations in exchange rates have been violent of late, and in international trade those fluctuations are equivalent to fluctuations in prices of the commodities bought and sold. One is more or less willing to deal in a fluctuating commodity when he is familiar with the commodity and can thus exercise his judgment based upon that knowledge, as to whether the price is likely to go up or down. Fluctuations in the exchange rate represent price changes of the commodity that come from an entirely extraneous source and have nothing to do with the market merits or demerits of the particular commodity, hence the difficulty in doing business.

Mere stabilization at any rate would be advantageous. For illustration, par of exchange between New York and Paris used to be about five francs to the dollar. If the rate were stabilized for a period of five years at ten francs to the dollar commerce between the United States and France would be greatly encouraged. It is necessary to assume for the argument that other countries would not interfere, though that is precisely what would occur, for all exchange rates are part of a general structure. This stabilization could be effected, granting the parties were willing, by an American capitalist and a French capitalist, each of unlimited means, agreeing with each other that the one would buy bonds from the other at the rate of one dollar for ten francs, the purchases and sales being made in one direction or the other from time to time accord-

ing to the requirements of the situation. We should then get French goods at half price and the French would pay double price for our goods. There would be nothing out of the way about that, of course, for these disparities in exchange rates reflect simply a still greater disparity in commodity prices in the respective countries. If exchange in New York on Paris is at 50 per cent discount and we do not buy French goods it means that those goods are more than twice as costly as similar goods in this country, freights not considered. Or if the Frenchman has to pay double price for exchange on New York, ten francs for a dollar instead of five, and still buys our goods, it means that the goods are worth more than twice as much in the French market as they are in our market.

The chief thing is to enable foreign countries to be more productive, so that they will have to buy less and can sell more. Thereby exchange rates would cease being forced farther from parity, but instead would tend to return towards normal. To stimulate production, rates between European countries need to be stabilized so that one country may be free to buy from another and not fear a loss. While buyers and sellers may be willing to take chances on commodity prices fluctuating, since they are familiar with the commodities, they cannot take chances with exchange rates since they cannot gauge the prospective fluctuations.

Obviously it is no advantage to the United States for prices to be so much higher abroad than they are in our domestic markets. We desire to have commerce, and those high prices prevent our buying foreign goods, while on account of the exchange situation produced by the disparity the foreigner must pay high prices for our goods.

More Skillful Letter Writing

The experience of many thousands of men in the Army and Navy, as officers or in clerical capacities, in making reports and in letter writing has had an effect already in the correspondence of business houses. Men have learned the value of terse but clearly worded and sufficiently comprehensive letters. Many business firms have realized for a long time how costly a thing unskillfully constructed letters may become. Ambiguity, omission of essential details, unnecessary length, untranslatable signatures, lack of friendly personal touch, roughness of diction, omissions of enclosures, the clumsy or inadequate form letter—all these and other sins of correspondence are mischief makers. In some large offices specialists review the daily correspondence, in the effort to effect improvement, and call attention of employees and owners too, if necessary, to the delinquencies and bad habits of their letter writing. They work out form letters, and seek generally to reduce the length of correspondence wherever it is possible and otherwise act for efficiency. Not only does the result show itself in relations with those with whom the firm does business, but there is a direct money saving in bills for stenography and typing and office supplies.

The Army and Navy training has helped this work along. Many a man who thought he could write a first rate letter has had his conceit destroyed by some one higher up in the service who received his efforts. The Army rule of typing the

signature as well as penning it has been adopted in some establishments, which is an excellent plan, for many signatures are blind though their owners do not always realize the fact. "Dictated but not read" and "signed in the absence of" are less often seen than formerly, because they could not be used officially in the service, though the protest against the practice had already been heard and in many cases heeded. At the top of a letter the subject to be treated is now often found. This, too, had previously been established as a practice in some offices. Altogether this new influence which came into business out of the war should work out results of a good deal of importance. The beginning had been made. The added impulse should send the movement for good letter writing a long step forward. Among the customs which might well become general is that of indicating, when answering a letter from some one connected with a large company, the person for whose attention the letter is intended. In every large office time is wasted almost daily in trying to determine for whom letters are intended.

Shop Newspapers

Shop newspapers are coming into existence in various industries every month. A really useful purpose is served, according to managers who have had experience with them. The local daily paper keeps the people in touch with what is going on in their community. The shop newspaper performs the same service in the smaller community of the works. It tends to create neighborliness and to spread acquaintance, and thus assists in welding the workers into a more homogeneous body. It affords owners and their representatives the opportunity to place before employees in an attractive, friendly way, announcements having to do with their employment. The approach to the reader is more tactful than in the curt, formal announcements posted on bulletin boards or distributed in pay envelopes or in other similar fashion. The news of the athletic teams and social doings is read with the greatest interest and each issue is looked forward to with expectation by the men and women. The influence toward increasing a loyal shop spirit is strong and it need not be said that such a spirit means greater returns both for owners and workers.

Alaska Produces Tin

The tin mines of Alaska produced 136,000 lb. of tin, valued at \$118,000, in 1918, according to the U. S. Geological Survey. These figures compare with 200,000 lb. valued at \$123,300, in 1917. The decrease in output in 1918 was due to the fact that only one dredge was operated. Additional tin, however, was recovered by sluicing. The first important production of Alaska tin was reported in 1902, when the output was 15 tons. Since 1912 the average has been over 100 tons annually.

Exports of Machinery

WASHINGTON, Dec. 22.—France was our best customer in September for metal working machinery. Out of a total exportation of \$3,701,502 of the various kinds of metal working machinery from the United States, for September, France received \$1,095,418. England's share was \$771,538, while Japan received \$381,038 and Canada \$375,740.

LAKE IRON ORE IN 1919

Water Shipments for the Season 14,000,000 Tons Less Than in 1918

The iron ore movement by water from the Lake Superior region during the season just closed was 47,177,395 tons, a decrease from 1918 of 13,979,337 tons or 22.85 per cent. The 1918 movement was 61,156,732 tons. The December total this year was only 46,662 tons, of which 26,390 tons was credited to Escanaba and 20,272 tons to Superior. The following table gives the season shipments by ports and the corresponding figures for 1918 in gross tons:

	Season, 1918	Season, 1919
Escanaba	6,774,969	4,963,358
Marquette	3,457,054	2,132,935
Ashland	7,565,608	5,915,383
Superior	14,068,341	10,919,965
Duluth	20,567,288	16,821,209
Two Harbors	8,723,472	6,424,545
Total	61,156,732	47,177,395
1919 decrease		13,979,337

Duluth shipped 35.66 per cent of the season's total with the Great Northern dock at Superior next with 19.32 per cent of the total.

The 1919 water movement is the smallest in the last four years, that for 1916, 1917 and 1918 having exceeded 61,000,000 tons in each year. The 1915 movement was 46,318,804 tons.

Pig Iron and Steel Output of the Leading Countries in 1919

The National Federation of Iron and Steel Manufacturers (British) has compiled official data of the pig iron and steel output of Great Britain, Germany and the United States as far as these have been reported in 1919. They present the following interesting comparative table in thousands of tons. For the United States the pig iron figures are those of THE IRON AGE's monthly reports, while the steel ingot figures are those of the American Iron and Steel Institute:

	Great Britain		Germany		United States	
1913 ave.	Pig Iron	Steel	Pig Iron	Steel	Pig Iron	Steel
per month ..	855	639	1,582	1,502	2,581	2,608
Jan., 1919	664	718	499	559	3,306	3,698
Feb.	625	734	469	516	2,940	3,219
March	684	758	551	635	3,090	3,168
April	653	668	434	428	2,478	2,665
May	662	755	517	594	2,108	2,296
June	612	631	519	631	2,115	2,641
July	660	618	572	785	2,429	2,985
August	521	474	561	729	2,743	3,269
September	574	718	524	726	2,488*
October	445	433	...	...	1,864*
November	630	693	...	...	2,392*

*Statistics not collected.

The average output to Dec. 1, 1919, in Great Britain was 612,000 tons per month of pig iron and 654,000 tons per month of steel. In Germany to Oct. 1 the pig iron output was 516,000 tons per month of pig iron and 622,000 tons per month of steel. The effect of the railroad strike in England early in October is apparent.

Will Re-erect Boiler Plant

The affairs of the Bethlehem Shipbuilding Corporation at Field's Point, Providence, R. I., have practically been wound up. According to Rear Admiral Parke, representing the Navy Department, the framework of the big boiler plant will be taken down at an early date and re-erected on a new site in Massachusetts, probably at Squantum (Quincy). Estimates of the cost of the removal have been made, but a few minor details remain to be worked out.

Advances in French Rolled Products

Due to higher prices for fuel and higher wages, Schneider & Co., the leading French producers of steel, have raised prices of rolled steel products, the advances ranging from 180 to 250 francs. At present rate of exchange these advances would represent additions of \$18.27 to \$25.38 to previous prices.

CORRESPONDENCE

Safeguarding Shipment of Steel Pieces

Editor The Iron Age: The loss of shafting, bar iron, bundles of iron, castings, molding, building material and similar articles is heavy by reason of the destruction of the tag with which the shipments are marked. Such losses in transit can be effectively stopped if the shipper will apply a second tag securely



wired to each piece and conceal it beneath a wrapping of burlap, as indicated in the accompanying photograph.

Very truly,

W. H. GATCHELL.

Staff Officer, Loss and Damage Prevention, Southern Railroad Lines.

WASHINGTON, Nov. 29.

Ductility in Metallic Arc Welds

To the Editor: A certain well-known metallurgist, a member of the research committee of the Bureau of Welding, has contributed a considerable amount of his time to the subject of ductility in metallic arc welding. As I understand the results, the lack of ductility in metallic arc welding is due to the ultra-microscopical films of iron oxide which surround the grains and thereby cause in every case an intergranular fracture and in no case, as he observes, a transcrystalline fracture. His view is held by the majority of engineers who have worked on this subject. Though he does not state this fact, I am of the impression that he has undertaken all his experiments with a welding electrode of comparatively low carbon and manganese; that is, under 0.20 carbon and 0.60 manganese. The tests given below were made with wire of approximately 0.35 carbon and 1 per cent manganese made by a special process, in comparison with a low carbon and low manganese electrode.

The question has often arisen as to the proper method of measuring the elongation of the welded specimen. Should the elongation be measured across the weld or should it take in 1 in. or 2 in. of the parent metal? If the engineer wishes to measure the elongation of the test piece as a unit, not taking into consideration the fact that he is dealing with two materials, which while they may have the same chemical composition, are widely different in structure, the proper method would be to take the elongation in either 2 in. or 4 in., using the weld as a center; if, however, the engineer wishes to know the physical characteristics of the material deposited in the weld, the proper method is to measure the elongation in 1 in. across the welded material. This has been the case in the physical tests given. The current used averaged 125 amperes at 35 volts.

	Elastic Limit	Tensile Strength	Elongation, Per Cent	Brinell
Average of six tests...	42,925	65,780	20	152
Average of five tests...	37,420	60,600	19	...
Average of five tests...	42,750	62,360	23	150
Average of six tests...	32,750	61,070	18.7	150

The following tests were made with low carbon, low manganese wire to show the comparison.

	Tensile Strength	Elongation
Average of 11 tests...	54,700	7.67
Average of nine tests...	56,700	10.00

Microscopical analyses of two pieces of metal, one which had an elongation of 6 per cent and one an elongation of 23 per cent, show practically the same structure, the difference evidently being due to the

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absence of the ultra-microscopical film of iron oxide in the test piece with the 23 per cent elongation.

In conclusion, it would seem that ductility in electric welding is possible to a greater extent than in oxy-acetylene welding, although in the former case it is not so much a question of the ability of the operator as it is the use of the proper kind of material, and the proper heat used and maintained in depositing the metal.

In view of the physical tests which are included, it would not be too much to surmise that physical characteristics can be controlled to a certain extent by heat treatment.

J. HAYWARD,
Metallurgist, Wilson Welder & Metals Co.
New York.

SHEET MAKING CAPACITY

Important Additions to Be Made in the Youngstown District—Market Conditions

YOUNGSTOWN, OHIO, Dec. 23.—Because of the cumulative demand for steel sheets from fabricators, the building trades, automobile makers and other classes of consumers and inability of productive capacity to meet the demand, large sheet mill extensions will be made in the Mahoning Valley in 1920. Announcement is expected shortly of plans of the Republic Iron & Steel Co. to enlarge the DeForest works at Niles, Trumbull County, purchased from the DeForest Iron & Steel Co. The Republic company is financing these extensions in part by the issuance of 26,480 shares of common stock at par.

The Falcon Steel Co. at Niles and the Newton Steel Co. at Newton Falls, both sheet producers, will get under way in the spring. The Trumbull Steel Co. is also planning additions to its sheet-making capacity. It is expected Charles S. Thomas, former president of the DeForest company, and associates, will build another sheet plant in 1920.

No sheets are obtainable in the Valley, and the principal producers are sold well into 1920. Some additional plate tonnage is being taken. Pipe mill schedules are well filled, but buyers are not confronted by the same condition that exists in the sheet steel trade. Valley pipe capacity, however, is well booked ahead.

One recent transaction included several hundred tons of black resale sheets, which brought between 6c. and 8c. Quotations, though, are nominal and practically without meaning. Only a long, steady productive period will enable mills to get back to normal basis again.

Sheet bars continue to command \$51, though they are practically unobtainable. Several spot sales at a high price are reported within the past 10 days. Makers, however, are booked over the first quarter and are not ready to take on business for much longer delivery until costs become more settled and the heavy backlog of orders which has accumulated by reason of the strike and interrupted operations due to coal scarcity is lessened.

British Workers Granted Advance

WASHINGTON, Dec. 23.—The Bureau of Foreign and Domestic Commerce has received a report from the American consulate general at London that the Arbitration Court has made an award on the demand of the workers in the engineering and foundry trades, which gives to workers over 18 years of age, an advance of \$1.22 per full ordinary week. The increase was put into effect Dec. 1 and is to last four months. It includes the workers belonging to the Amalgamated Society of Engineers, the Federation of Engineering and Shipbuilding Trades, National Federation of General Workers, the National Brass Workers and Metal Mechanics, the Amalgamated Machine Engine and Iron Grinders and Glaziers' Society, the Amalgamated Moulders' Union, and the General Iron Fitters' Association. The arbitrators state that the total advances over pre-war rates given under former awards amount to not less than \$6.94 a week, plus 12½ per cent on earnings in the case of time workers, and to \$5.23 a week plus 10 per cent or over on piece rates, and 7½ per cent on earnings in the case of piece workers.

One Method of Increasing Production

For the past 10 years, employees of the Cleveland Crane & Engineering Co., Wickliffe, Ohio, have been given a bonus on July 1 and December 31, representing their share of the profits distributed for faithful service.

Under this system each employee who has not been absent from work more than one day each month during a period of six months, unless hindered by sickness or other causes, for which he can give a reasonable excuse to his foreman, 2 per cent of his wages

has been paid for each full year that he has been in the employ of the company.

A number of the old employees will receive checks amounting to 20 per cent of their wages for the past six months. This method has been the means of stimulating production. Ten per cent of the men on the pay roll have not lost a single day for six months. Of the entire number of employees approximately 2½ per cent of time has been lost.

German Foreign Trade Advertising Plans

The German engineering industries are preparing a scheme to distribute their technical and trade papers in foreign countries on a large scale. Under the leadership of the National Association of German Manufacturers (Reichsverbund deutscher Industrieller) and the Society of German Engineers (Verein deutscher Ingenieure), a combine or trust of the German industrial press is to be formed for a concerted effort in the above mentioned direction. Besides, a large monthly paper devoted solely to the export of engineering manufacture will shortly be issued in four languages, German, English, French and Spanish. German works are subscribing freely to this enterprise in the shape of large display advertisements. The paper will have a large free circulation abroad, which is paid by the German works, each taking up the fees for a number of copies for a period of five years. Krupp's alone are said to have contracted to pay for a mailing list of 3000 during that period. This part of the scheme is under the management of the "Ala" Allgemeine Anzeigen Gesellschaft m.b.H., a company closely connected with the Rhenish industrial interests. The "Ala" intends to establish offices in all the foreign capitals to act as distributing centers, advertising agencies, and news gatherers for the "Oversea Service," a large news agency for industrial and commercial news.

Proposed Peace-Time Organization

WASHINGTON, Dec. 23.—Creation of a peace-time skeleton organization similar to the War Industries Board and protection of products which would be needed in case of war are recommended in a report from Bernard M. Baruch to President Wilson. The report submits recommendations for the consideration of Congress based on Mr. Baruch's experience as chairman of the War Industries Board. Mr. Baruch believes there should be created a peace-time skeleton organization based on the experience of the war-making agencies. It should be headed by a chairman who, when the emergency arises, should be granted the powers necessary to co-ordinate and synchronize the economic resources of the country. With him should be associated the representative of the Army and the Navy, or any other department vitally interested, as the Shipping Board, who should have centralized under them the various purchasing branches of their departments.

Germany's Iron Ore Supplies

In the November issue of *Deutsche Rundschau*, Professor Beumer of Düsseldorf, discussing the future of the German iron industry, points to the necessity of opening up new iron ore beds in Germany. The state, he declares, is not in a position to undertake this, and it is therefore gratifying that the Association of German Iron Masters has formed an ore committee, which has been joined by all the leading iron works. This committee will not only undertake technical investigations and the theoretical and practical work connected therewith, but will also deal with the distribution of the ore. At present ores destined for the various works are sent up and down the railroads without plan or system. With systematic distribution the cost can be much reduced.

The Peerless Drawn Steel Co., Massillon, Ohio, is making some additions to its plant, and will likely need some new equipment. The company is a manufacturer of cold finished rounds, flats, hexagons, squares, special shapes and alloy steels.

Right to Seek Work Vigorously Asserted

Judge of United States Court Condemns Action of Mayor of Cleveland and Grants Injunction Asked for by American Steel & Wire Co.—Case Grows Out of Strike

AN important decision making clear that mayors and police of municipalities have no legal authority to take the side of strikers and drive from a city workmen who have come in to take the places of men on strike was handed down by Judge John C. Westenhaver in the United States District Court in Cleveland Dec. 17. The court action grew out of the steel strike, the opinion being given on application for an injunction that was made by the American Steel & Wire Co. against Mayor Harry R. Davis and the chief of police of Cleveland.

During the recent steel strike, failure of the executives and police officers of several Ohio cities to afford proper protection to loyal employees of the steel companies who quit work only because of intimidation and lack of police protection was a disgrace to the State. Mayor and police officers in some of the cities quite plainly indicated that their sympathies were entirely with the strikers. The mayor of Canton was removed by the Governor, after being given a hearing following charges growing out of the way the strike situation was handled in that city.

In Cleveland the situation was particularly exasperating because of the high-handed stand without the authority of law taken by Mayor Davis, who was making a campaign for re-election while the strike was in progress and wanted to win the union labor vote. He declared in speeches and in newspaper interviews that the steel companies would not be allowed to import employees, and following his instructions, workmen arriving in Cleveland to work in the mills were arrested on leaving trains, after being locked up several hours and finally either released or driven from the city by the police. These men were not thugs and criminals, but American citizens of respectable appearance and good character and many were recently discharged soldiers and still wore their uniforms. Not only did the Cleveland police, in pursuance of the mayor's orders to keep out workmen from other cities meet incoming trains, but in some cases boarded trains before they reached the city.

Stops Persecution

To put a stop to this illegal persecution of law-abiding workmen the American Steel & Wire Co. brought proceedings in the Federal Court, first in the form of a habeas corpus action to secure the release of men illegally detained, and a day or two later by a suit to enjoin the mayor and chief of police from interfering herewith the importation of workers. Judge Westenhaver in the Federal Court promptly decided both cases in favor of the plaintiff and later handed down a lengthy opinion in the injunction proceeding in which he reviewed the facts of the case as submitted by both sides.

How Men Were Treated

The court found that the imported workmen were arrested without warrant and without reasonable grounds to believe that they had committed felonies and without finding any of them at the time of their arrest violating any Federal or State law or municipal ordinance. The court said that it made no difference whether the men were American citizens or not, the law would be the same if they were aliens lawfully admitted into this country. The opinion referred to court decisions holding that police officers cannot lawfully arrest and detain anyone without warrant regularly issued, except under certain definite conditions which were defined. Consequently, the arrest of the workmen was illegal and in violation of the plaintiff's rights. A paragraph of the court opinion reveals the autocratic methods of the Cleveland police in driving workmen from the city. Referring to the testimony of one wit-

ness relating to a specific case of the deportation of 200 men, the opinion reads:

Autocratic Methods Adopted

"A double line of police officers guarded the means of escape inside the station; the men in charge of the policemen were marched through the lines of guards to the departing train. One of the group who tried to escape was violently thrown back by the police into the ranks and compelled to go with the others. All of the group, according to this witness, were men of respectable dress and appearance, and many of them in uniform of discharged soldiers of the United States Army and Navy. The newspapers of the city next day reported that 200 men who had come to the city to work in the plants of the plaintiff had been stopped by the police and compelled to board trains and leave town. This merely conforms to what the newspapers had previously reported, and quoted the mayor as declaring would be done with all strike breakers."

The court held that the effect of the procedure of the Cleveland police was to make it exceedingly difficult for the plaintiff to procure men and that the mere proclamation of the mayor and chief of police that imported workmen would be arrested and detained and investigated would inevitably tend to prevent the plaintiff from obtaining employees. In this connection the court said:

Company Entitled to Relief

"That plaintiff is entitled to relief by injunction in this situation is obvious from a consideration of well settled legal principles. It is engaged in a lawful business and has a right to conduct that business without unlawful interference, either by its striking employees or any other persons. It may solicit and procure persons to work in its plant, no matter where they reside, or whether citizens of the United States or not. No one may lawfully interfere with this right of plaintiff, and if deprived thereof, its property is destroyed. This is also equally true of all persons desiring to enter into the employment of plaintiff. To deny any such person that right because he does not live in Cleveland would be to abridge privileges and immunities belonging to every citizen of the United States and protected by its constitution from a denial or abridgement by any state. The protection accorded by the constitution of Ohio is equally sweeping. The power to preserve the public peace and to arrest and prosecute persons for crime cannot be made to support action depriving persons of these constitutional rights and privileges."

Rights of Strikers Defined

Taking up the question of picketing, the opinion stated that strikers have a right peacefully to dissuade others from taking their places, but they have no right by violence, intimidation, coercion or threats to prevent the former employer from conducting his business at will or from obtaining other persons to take their places or from entering the plant. In all cases where picketing is allowed, the courts have not hesitated to restrain or regulate picketing in such a way as is necessary to prevent violence, coercion, and intimidation from being used against employees or those seeking employment. In this connection the court referred to various cases in which the same question had been brought up. One of these was that growing out of the recent strike at the Willys-Overland plant in Toledo, in which Federal Judge John M. Killits limited the number of pickets on duty at any one time to 50, not more than six of whom should be on duty at any one gate, and required each picket to wear a conspicuously numbered badge in order that any picket guilty of

threatening, intimidating, etc., might be identified and proceeded against for contempt.

Calling Employees "Strike Breakers"

Applying the decisions in the Willys-Overland and other cases involving picketing, the court held that the principles applied in these cases were equally applicable in the Cleveland case.

"What striking employees will not themselves do to prevent an employer from conducting his business may not be done by police officers under the guise of preserving peace or preventing crime," continued the opinion. "Such conduct is outside of any power or authority conferred by law on police officers. Nor will the calling of such employees 'strike breakers' enlarge the power of police officials. A strike breaker is really one who takes the place of workmen on strike. Defendants in this hearing seek to give a different meaning to the term strike breaker, but the procedure followed since first adopted shows that the illegal arrest and interference has been with persons whose only offense was taking the place of plaintiff's former employees at the time of strike. The criminal procedure for arresting and prosecuting for crime is no different when applied to strike breakers as thus defined than to any other persons guilty of crime."

Another Infringement of Rights

Another attempt was made by the City of Cleveland to take away the rights of employees during the steel strike in an ordinance passed by the Cleveland council, Sept. 22, to regulate the employment of strike guards. This ordinance provided that no person, firm or corporation shall during any industrial disturbance or strike employ any person as special guard unless such person shall be empowered to act as such special guard by the director of public safety of the city, and that any person desiring to act as such guard shall make application through the director and furnish him any information he may require. If the applicant has resided in the city less than six months and fails to file satisfactory recommendations with the director of public safety from the police department of the city of his last residence, his description and an impression of finger prints, shall be forwarded to the police department of the place of last residence and no action taken upon his application until satisfactory information is received from said police department. Every person empowered to act as special guard shall give a \$1,000 bond and be directly under the orders of the chief of police. Any person, firm or corporation employing a special guard in violation of the terms of the ordinance is liable to fine and imprisonment.

Violation of Constitutional Rights

The committee on labor relations of the Cleveland Chamber of Commerce regarding this ordinance as drastic, vague and ineffectual, asked the legal counsel of the Chamber, Hoyt, Dustin, McKeehan & Andrews, to submit an opinion as to the scope and effectiveness of this measure. This opinion, which has recently been prepared, points out that the ordinance attempts to regulate two constitutional rights, the right of freedom of contract and the right to protect property. The opinion states that the right of freedom of contract and of protection of property are not absolute, but are subject to regulation which is reasonable and necessary for the public good. The ordinance undertakes to prescribe, according to the opinion, not the manner in which private property may be protected, but who shall protect it to the exclusion of all other persons. The choice of the personnel to champion the right of protection of property guaranteed by the Bill of Rights is taken away from the owner of that property and conferred upon another.

In the opinion of the attorneys, the promiscuous employment of professional strike breakers during industrial disorders threatens the public peace and should be regulated, but the regulation must be reasonable. The ordinance attempts to confer upon the director of public safety absolute discretion to grant or refuse the privilege of entering into contracts for the em-

ployment of private guards or watchmen. Guards or watchmen desired by the owner of the property must prove themselves satisfactory to the director who is bound by no rules or regulations and might be controlled by a variety of motives and influences. Under the wording of the ordinance, the owner of the property might be wholly disconnected legally, commercially and geographically with the strike or industrial disturbance and yet be subject to the prohibition of the ordinance. Furthermore, the ordinance seeks to include not only private policemen, but anyone who may act as protector of property in any manner whatsoever.

In conclusion, the attorneys declared that the ordinance is an abuse rather than a use of police power conferred upon the city by the constitution of the state, and that is an unreasonable and unnecessary evasion of constitutional rights of freedom, of contract and of the protection of property, and they advised that the best method to deal with the ordinance was to ignore it completely. If the city made an attempt to enforce its provision, its invalidity could be established when legal proceedings were instituted.

American Foundry Equipment Co. Builds in Chicago

The Sand Mixing Machine Co., Cleveland, and the Rich Foundry Equipment Co., Chicago, which recently combined under the name of the American Foundry Equipment Co., have acquired a site of three acres in the Kenwood manufacturing district in Chicago, and are erecting a plant which will be ready for occupancy about March 1. On the site at Forty-seventh Street and Kedzie Avenue, purchased from the Phipps Estate of New York, the C. A. Moses Construction Co., Chicago, is erecting a building 100 x 300 ft., with the second story a mezzanine floor fronting three sides and leaving a craneway in the center of the building. The structure will provide 52,500 ft. of floor space. The plant is located on the Belt Line, from which a siding runs through the center of the building.

Employee Participation in Management

Employee participation in management will be one of the topics to be discussed at the annual meeting of the American Association for Labor Legislation. The session is scheduled for Tuesday afternoon, 2.30 p. m., Dec. 30, at the Hotel La Salle, Chicago. Royal Meeker, United States commissioner of labor statistics, will present the main paper, and among those scheduled to discuss it are William C. Procter, Procter & Gamble Co., Cincinnati, and F. S. Deibler, Northwestern University. At a session scheduled for the evening of the same day several papers will be presented, including one entitled, "The Challenge of the Industrial Situation in America," by John A. Fitch, New York School for Social Work.

Pittsburgh Foundrymen's Association

The monthly meeting of the Pittsburgh Foundrymen's Association was held in the Elk's Club, Pittsburgh, on Monday evening, Dec. 15, and was preceded by a dinner. Various forms of entertainment were provided, and it was an entirely social session, no papers being read. Isaac W. Frank, chairman of the board of directors of the United Engineering & Foundry Co., Pittsburgh, spoke, and Brigadier-General Edgar Jadwin gave a very interesting talk on his experiences and observations in the Ukraine.

Official reports show that several hundred employees have oversubscribed the new issue of preferred stock of the Truscon Steel Co., Youngstown, Ohio. The stock to the amount of \$1,000,000, with a par value of \$10 a share, was authorized by the directors Oct. 7.

Publication of the "Grid," the house organ of the Edison Storage Battery Co., Orange, N. J., was instituted with the October number. It is to be published quarterly in the interest of users of storage batteries.

STEEL SURPLUS SOLD

Large Tonnage Disposed of by U. S. Government—France Sells Billets

WASHINGTON, Dec. 23.—After rejecting all bids offered in the usual manner, officials of the Emergency Fleet Corporation disposed of approximately 300,000 tons of surplus steel of miscellaneous sorts in an open sale during the past week. The price obtained totaled between \$10,000,000 and \$11,000,000. Fabricated scrap totaling about 150,000 tons brought \$25 a ton, while unfabricated steel totaling about the same quantity, brought \$45 a ton. It was estimated that about \$1,250,000 more was obtained for the steel than if the highest bids previously made had been accepted.

A group of men purchased the entire amount and deposited a check for \$250,000 to bind the sale. They were L. B. Barde of the firm of Barde & Son, Portland, Ore.; Ernest Dugas, Philadelphia, and J. Russell Hundley and C. H. Tribe, New York. They outbid a considerable number of others from eastern cities.

It took an entire day to put through the sale. John Barton Payne, chairman of the Shipping Board, acted as chief auctioneer. Others present included John A. Donald and Thomas A. Scott, members of the board; J. C. Ackerson, general manager of the Emergency Fleet Corporation, and Charles F. Patterson, general counsel.

Among the unsuccessful bidders were representatives of the Carnegie Steel Co., H. A. Hitner, Sons & Co., of Philadelphia; Charles Shongood of New York, Charles G. A. Pfitsch of the National Bureau of Supplies, Thomas Friedeberg of New York, R. D. Young, Harris Bros. of Chicago, and a group composed of Carl P. Briggs, James H. Turvis and L. Greenberg, represented by former Senator James Hamilton Lewis of Illinois.

The steel involved in the sale is the entire surplus located at points east of the Rocky Mountains and north of North Carolina. The purchasers intend to sell it to manufacturers.

The highest bid offered for the steel previously was in the neighborhood of \$39 a ton.

The Boston District Ordnance Office, Salvage Board, has made the following awards:

202,743 lbs. 15-in. steel armor plate to the Midvale Steel & Ordnance Co., at \$30 per net ton f.o.b. Fitchburg, Mass.
2,877 lbs. 110-in. round Tobin bronze 10-ft. rod to the Metric Metal Works, at \$24 per 100 lbs. f.o.b. Orange, Mass.
1,561 lbs. strip brass to the Garden City Plating & Mfg. Co., at \$14.10 per 100 lbs. f.o.b. Scituate, Mass.

France Sells \$5,000,000 Worth of Billets

One of the largest transactions in steel this year was consummated Dec. 19 when the Steel Producers Export Corporation, 120 Broadway, New York, purchased from the French Republic billets amounting to over 130,000 tons for \$5,000,000. The billets were made by American steel manufacturers and sold by them to the French Government for war purposes, but after the armistice they were merely surplus material. They are chiefly located at tidewater ready for export and distribution. They include both open hearth and electric steel, to metric measurements and to French specifications and range from 3¼ in. to 13 in. sizes. The seller was represented by Commander Breton, head of the French artillery commission, and the buyer by Maxim Karminski, president of the Steel Producers Export Corporation. The purchaser will dispose of its acquisition in this country and abroad. The corporation represents the Knoxville Iron Co., the Rockaway Rolling Mill, and the Atlantic Nail & Wire Co.

War Department Sales

WASHINGTON, Dec. 23.—The Salvage Division of the Quartermaster General of the Army is offering for sale under sealed proposals approximately 100,000 tons of machine shop drillings and turnings, all clean

and practically dry, located at the Springfield armory, Springfield, Mass. Bids for them will be received until 2 o'clock on the afternoon of Dec. 30, by the Salvage officer at the armory.

Total sales of the War Department for the week ended Dec. 12, amounted to \$3,994,842. The largest figure of the weekly total was \$1,283,572, the receipts for the week from the Army Quartermaster retail stores. From Jan. 1 to Dec. 12, total sales by the War Department amounted to \$528,520,830, which represents a recovery by the Government of approximately 73 per cent. of the original cost of the materials sold. Sales during the week of Dec. 5, included machine tools and machinery valued at \$539,490.

The War Department has now liquidated 22,918 contracts valued at \$2,134,643. There remain to be liquidated from those suspended at the signing of the armistice 4919 contracts.

The office of the Chief, Motor Transport Corps reports the sale of 3021 unserviceable motor vehicles to Dec. 15 for a total of \$981,533. Of these, 1924 trucks brought an average of \$411; 847 touring cars an average of \$210, and 250 motorcycles with side cars, \$42.86. Approximately 5000 more vehicles have been declared unserviceable according to reports received at the office of the Chief, Motor Transport Corps, and these are to be offered for sale in the near future.

Demands of Molders in Cleveland and Other Ohio Cities

Cleveland molders have made demands on union foundries for an increase from \$6 to \$8 for an 8-hour day, every other Saturday off during the entire year for molders in gray iron foundries, or an average 44-hour week, and every Saturday afternoon off in the steel foundries, an allowance of 10 minutes of the employees' time in which to wash up before quitting work, a weekly pay-day and pay in cash instead of checks. The present wage agreement with the molders expires Dec. 31. Molders in Massillon and Alliance, Ohio, have demanded an increase of from \$6 to \$7 for an 8-hour day, and those in Newark, Ohio, have asked for an advance of \$6 to \$8 for 8 hours.

German Machine Tool Industry

The annual report of the Association of German Machine-tool Works gives the following particulars of the development of the German machine-tool industry:

Year	Output, Tons	No. of men employed	Average output per head	Exports in million marks
1913.....	950,000	54,300	17	100
1914.....	850,000	54,400	16	75
1915.....	530,000	51,100	10	40
1916.....	330,000	54,600	6	24
1917.....	680,000	59,600	10	12
1918.....	260,000	71,900	4	20

In 1913 machine tools to the amount of 950,000,000 marks were produced. In the course of the war the capacity of output has increased.

Woolwich Arsenal to Build Locomotives

LONDON, ENGLAND, Dec. 5.—The Woolwich Arsenal just outside London, is to be used for the manufacture of railroad rolling stock.

To check the recent heavy discharges of men from the arsenal, the Government is said to have decided to develop it as a railroad center in order to overcome the world shortage of locomotives and wagons.

During the war about 110,000 were employed, but the figure has now been reduced to about 30,000.

Fuel Restrictions Removed in West

CHICAGO, Dec. 22.—All restrictions on the movement of coal have been canceled in Chicago and the Northwest railroad region. It is no longer necessary for so-called non-essential industries to file applications with the Fuel Administration. Approximately 3000 cars of eastern coal, rushed to Chicago by the fuel authorities, are being disposed of with great difficulty because the cheaper Illinois and Indiana product is now available.

Iron and Steel Markets

PRICES TEND UPWARD

Mill Operations Not Abreast of Demand

Large Rail Tonnage Pending—Growing Business in Structural Steel

The steel trade approaches the end of the year with mills still guarding against overloading of their books. Buyers are by this time so well aware of the sold-up condition of some leading manufacturers that they are not pressing for contracts to the degree noticed a few weeks ago.

Some mills that have been refusing business since the beginning of the coal strike have capacity open for the first quarter of 1920, but the uncertainty about their costs still exists and their selling policy is not likely to change until the situation has developed further. In some cases prices quoted purposely high to discourage business have been promptly accepted.

Production in the leading centers varies little from that of recent weeks, and coal supply has not increased to the extent indicated by reports from the mines. While coke restrictions have been removed and output of steel-making pig iron is somewhat larger, finishing mills have not shown corresponding gains. Rolling mill working forces are not yet balanced and it is evident that a good many workers who were on strike have drifted into other employments.

The market shows rather more contrast between the policy of the Steel Corporation in holding to the prices of March 21 and that of most other producers in selling in their limited way at prices more nearly in line with the advance of \$10 to \$12 per ton in pig iron that has taken place since Oct. 1.

The expectation of considerable railroad business after Jan. 1 is quite general, and in rails alone the amounts tentatively named by the Pennsylvania, the New York Central, the Reading, and Norfolk & Western, together with what has come forward in the Chicago district, foot up from 800,000 to 1,000,000 tons.

A significant development is the purchase by the Long Island Railroad of 100 passenger cars for which no cash is paid, but 20 per cent in notes with yearly payments over ten years and 80 per cent in car trust certificates. For the Belgian locomotives placed here, five-year notes not negotiable but available for collateral are to be taken.

Signs point toward 2.50c., Pittsburgh, for steel bars, 2.55c. for shapes and 2.75c. for plates as the minimum prices for second quarter delivery by those mills which have not yet got under full operation but have bookings which cover the first quarter. Meanwhile business for the same period is being taken by the smaller makers at \$5 and \$10 per ton higher for bars and plates.

With the sustained activity in fabricated steel work, 1919 bids fair to equal the lean years of 1913 and 1914, when not over 1,100,000 tons was contracted for in each case. In the first six months of 1919 the total business did not exceed 325,000 tons, but in the five months since about 680,000 tons was done, November contracting, according to the Bridge

Builders and Structural Society, being 69 per cent of the capacity of the country's shops, or 124,000 tons.

For the Steel & Tube Co., at Indiana Harbor, 2935 tons of steel work has been placed for extensions to the pipe mills.

Sharp competition for high speed steel orders just placed in the Central West developed prices as low as \$1 per pound, whereas the recent market on current deliveries has been \$1.40.

The Carnegie Steel Co. has again appeared as the only bidder as low as 2.50c., Pittsburgh, on plates, the price being quoted on 10,000 tons for the Navy. An Eastern shipyard has bought 15,000 tons and the Bethlehem Shipbuilding Corporation requires 14,000 tons. For Seattle yards 75,000 tons is under inquiry for the first half of 1920.

Cast-iron pipe has advanced \$4 per ton, or to \$69.80, Chicago, for 4-inch. Pipe foundries have fairly good bookings for the year-end.

Foundry pig iron sales have fallen off. Merchant furnaces have had poor car supply and there are indications that non-union coal mines have had to give up cars they had during the strike to union mines just now resuming.

Two large transactions in surplus war steel have been put through in the past week. In one a New York export firm bought upward of 130,000 tons of shell billets stored at Atlantic ports and belonging to the French Government, the intention being to resell the steel to domestic or foreign rolling mills. The second sale was of 300,000 tons, half of it fabricated scrap, by the Emergency Fleet Corporation to a group of dealers.

Price advances continue in England. Tin plate for the second quarter is, at to-day's exchange, \$9.40 per box at Welsh works and \$10.50 is the price on early delivery sales. Steel bars and plates are 3.75c. per pound and higher; and galvanized sheets 7.35c. Holland is inquiring for 50,000 tons of bar iron.

Pittsburgh

PITTSBURGH, Dec. 23.

The usual holiday quietness has settled down on the iron and steel trade, and while inquiry for pig iron, semi-finished steel and finished steel products is still very heavy, the amount of business being placed is not as large as a week or two ago. This is mainly for the reason that blast furnaces have little pig iron to sell, steel plants have no billets or sheet bars to offer, and the finishing steel mills are also well sold up over first quarter, and again some jobbers and consumers have decided to wait until after the turn of the year before placing orders. The whole market is very firm, and with the sold-up condition of blast furnace and steel mills, together with the active demand, producers look for higher prices early in the year on their products.

The feature of the market is that the subsidiaries of the United States Steel Corporation, under instructions from New York, are maintaining absolutely the March 21 schedule of prices, and not one of the Steel Corporation's subsidiaries has sold a ton of steel at higher than the March 21 prices since the upward turn in the market started late in October.

A large independent steel interest here has been selling very guardedly of its varied lines of products for more than a month, stating that it had all the business on its books it can possibly turn out for at least

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918
No. 2 X, Philadelphia...	\$41.10	\$41.10	\$36.10	\$39.15
No. 2, Valley furnace...	39.00	38.00	32.00	34.00
No. 2, Southern Cin'ti...	39.00	38.60	36.60	37.60
No. 2, Birmingham, Ala.†	36.00	35.00	33.00	34.00
No. 2, furnace, Chicago*	40.00	40.00	32.00	34.00
Basic, del'd. eastern Pa.	38.00	35.00	31.25	36.90
Basic, Valley furnace...	35.00	35.00	30.00	33.00
Bessemer, Pittsburgh...	37.40	37.40	32.90	36.60
Malleable, Chicago*	40.50	40.50	32.50	34.50
Malleable Valley...	38.00	37.00	32.00	34.50
Gray forge, Pittsburgh...	36.40	36.40	32.40	34.40
L. S. charcoal, Chicago...	42.50	42.50	39.00	38.85

Rails, Billets, Etc., Per Gross Ton:	Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918
Bess. rails, heavy, at mill.	\$45.00	\$45.00	\$45.00	\$55.00
O.-h. rails, heavy, at mill.	47.00	47.00	47.00	57.00
Bess. billets, Pittsburgh...	48.00	48.00	43.00	43.50
O.-h. billets, Pittsburgh...	48.00	48.00	43.00	43.50
O.-h. sheet bars, P'gh...	50.00	50.00	46.00	47.00
Forging billets, base, P'gh	60.00	60.00	58.00	60.00
O.-h. billets, Phila.	54.00	54.00	47.50	47.50
Wire rods, Pittsburgh...	60.00	60.00	55.00	57.00

Finished Iron and Steel, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	3.745	3.745	3.245	3.745
Iron bars, Pittsburgh...	3.50	3.25	3.25	3.50
Iron bars, Chicago...	2.87	2.87	2.77	3.50
Steel bars, Pittsburgh...	2.75	2.75	2.75	2.70
Steel bars, New York...	3.27	3.27	3.12	2.97
Tank plates, Pittsburgh...	2.65	2.65	2.65	3.00
Tank plates, New York...	3.02	3.02	2.92	3.27
Beams, etc., Pittsburgh...	2.45	2.45	2.45	2.80
Beams, etc., New York...	2.82	2.82	2.72	3.07
Skelp, grooved steel, P'gh	2.45	2.45	2.45	2.70
Skelp, sheared steel, P'gh	2.65	2.65	2.65	3.00
Steel hoops, Pittsburgh...	3.25	3.25	3.25	3.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

†Silicon 1.75 to 2.25. ‡Silicon 2.25 to 2.75.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918	
Sheets, black, No. 28, P'gh	4.35	4.35	4.35	4.70
Sheets, galv., No. 28, P'gh	5.70	5.70	5.70	6.05
Wire nails, Pittsburgh...	4.50	4.50	3.50	3.50
Plain wire, P'gh.....	3.25	3.25	3.10	3.25
Barbed wire, galv., P'gh.	4.45	4.45	4.25	4.35
Tin plate, 100-lb. box, P'gh	\$7.00	\$7.00	\$7.00	\$7.35

Old Material, Per Gross Ton:	Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918
Carwheels, Chicago.....	\$31.00	\$30.00	\$30.00	\$27.00
Carwheels, Philadelphia...	30.00	30.00	30.00	25.00
Heavy steel scrap, P'gh...	25.00	25.00	23.00	25.00
Heavy steel scrap, Phila.	22.50	22.50	21.50	20.00
Heavy steel scrap, Ch'go	22.00	20.50	20.50	23.00
No. 1 cast, Pittsburgh...	30.00	30.00	28.00	27.00
No. 1 cast, Philadelphia...	32.00	31.00	29.00	28.00
No. 1 cast, Ch'go (net ton)	33.50	32.50	29.50	26.00
No. 1 RR. wrot, Phila.	31.00	30.00	30.00	32.00
No. 1 RR. wrot, Ch'go (net)	24.00	23.00	23.00	25.00

Coke, Connellsville, Per Net Ton at Oven:	Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918
Furnace coke, prompt....	\$6.00	\$6.00	\$6.00	\$6.00
Furnace coke, future....	6.00	6.00	6.00	6.00
Foundry coke, prompt....	7.00	7.00	7.00	7.00
Foundry coke, future....	7.00	7.00	7.00	7.00

Metals, Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Dec. 23, 1919	Dec. 16, 1919	Nov. 25, 1919	Dec. 24, 1918	
Lake copper, New York...	29.00	19.25	19.50	26.00
Electrolytic copper, N. Y.	28.75	18.87½	19.00	26.00
Spelter, St. Louis.....	8.20	8.25	7.85	8.05
Spelter, New York.....	8.55	8.60	8.20	8.40
Lead, St. Louis.....	7.10	6.90	6.55	6.15
Lead, New York.....	7.35	7.15	6.75	6.50
Tin, New York.....	55.50	53.50	54.12½	72.00
Antimony (Asiatic), N. Y.	9.62½	9.62½	9.25	8.00

first quarter. Other independent steel mills report they have very little material to sell for first quarter.

Pig Iron.—Actual sales of pig iron were not so heavy in the past week, largely due to the fact that merchant furnaces are well sold up for first quarter and have very little iron to spare for that delivery. Inquiry for basic and Bessemer iron is not so active as during the past three or four weeks, but prices are very firm. There is active inquiry for malleable and foundry iron, and prices are up again on both grades about \$1 per ton. A sale of 4000 to 6000 tons of malleable for first quarter is reported at about \$38 valley furnace.

The following quotations are all per gross ton at Valley furnaces, freight rate for delivery in the Cleveland and Pittsburgh districts being \$1.40 per ton.

Basic	\$35.00
Bessemer	36.00
Gray forge	37.00
No. 2 foundry	39.00
No. 3 foundry	38.50
Malleable	38.00

Ferroalloys.—Inquiry for ferroalloys has quieted down somewhat, most consumers being well covered over first quarter, but prices remain very firm.

We quote 78 to 82 per cent domestic ferromanganese \$130 delivered, and English at \$110, with a reduction of \$1.50 to \$1.75 per unit for lower percentages. We quote resale 50 per cent ferrosilicon at \$80 to \$85 and 18 to 22 per cent spiegeleisen at \$36 to \$38, delivered. Prices on Bessemer ferrosilicon are: 9 per cent, \$56.50; 10 per cent, \$59.50; 11 per cent, \$62.50; 12 per cent, \$66.10. We quote 6 per cent silvery iron, \$43.75; 7 per cent, \$48.00; 8 per cent, \$50.00; 9 per cent, \$52.00, and 10 per cent, \$54.50. An advance of \$3.30 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on Bessemer ferrosilicon, and an advance of \$2.50 per gross ton is charged for each 1 per cent silicon for 11 per cent and over on silvery iron. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, which have a uniform freight rate of \$2.90 per gross ton for delivery in the Pittsburgh district.

Semi-Finished Steel.—Reports are that as high as \$50 at mill has been offered for 4 x 4-in. open-hearth billets, prompt delivery, and the intending buyer was unable to get the steel. The situation in billets and sheet bars is very tight, and all the mills are very much back in shipments. We note a sale of 200 tons of forging billets, ordinary carbons, at \$64 Pittsburgh.

We quote 4 x 4 in. soft Bessemer and open-hearth billets

at \$48; 2 x 2-in. billets at \$48 to \$50; slabs, \$47 to \$48; sheet bars, \$50, and forging billets, \$64 to \$66 base, all f.o.b. at mill Pittsburgh or Youngstown.

Finished Material.—The Steel Corporation subsidiaries are selling freely for first quarter delivery on some of their steel products at the March 21 prices, but some independent mills are selling at anywhere from \$10 to \$20 a ton, or more, above these prices. This makes a very wide range in prices on finished steel products. The amount of new business offering is very heavy, but most mills are turning down more orders than they are taking, as they cannot possibly make delivery wanted. Stocks are very low and on wire nails there is a famine in supply, with intending buyers offering the mills \$1 to \$1.50, or more, over the March 21 price of \$3.25 per keg.

We quote steel bars rolled from billets at 2.75c. and from old steel rails, 3c. Pittsburgh mills rolling iron bars quote at 3.35c. Pittsburgh, plus full freight rate to point of delivery.

Structural Material

Beams and channels up to 15-in., 2.45c., Pittsburgh, large lots.

Plates

Sheared tank plates, ¼-in. and heavier, at 2.65c. to 2.75c. Pittsburgh, depending on order and delivery.

Spikes

We quote standard spikes, 9/16 x 4½ in., at \$3.35 base per 100 lb. in carload lots of 200 kegs of 200 lb. each, and small spikes, ¾ in., 7/16 in. and smaller, at \$4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, plus usual extras. Boat and barge spikes, \$4.25 per 100 lb. in carload lots of 200 kegs of 200 lb. each, all f.o.b. Pittsburgh. For less than carload lots 1c. per lb. higher is asked.

Cold Rolled Strip Steel

We quote cold rolled steel at \$5.35 to \$6.00 base per 100 lb. f.o.b. Pittsburgh, for 1½-in. and wider, 0.1000 in. and thicker, hard tempered in coils 0.20 carbon and under. Boxing charge, 25c. per 100 lb.

Coke.—The resumption of practically normal operations at the coal mines has greatly increased the output of coke, and shipments to the furnaces are fairly heavy. The fact that the price of furnace coke is \$6 as fixed by the Government, and that coal is only \$2.35 per net ton for run of mine, mean that some coal operators that have been shipping coal freely will likely put more coal

into coke, as the profit is much larger on the latter. We continue to quote standard grades of blast furnace coke at \$6 and 72-hr. foundry at \$7 per net ton at oven.

Old Material.—The demand has quieted down a little, some consumers deferring intended purchases until after the year. Prices are very strong and all the local dealers in scrap look for a higher market early in the new year, due to the scarcity of scrap for early delivery, and also to the high prices ruling for pig iron. Many consumers of heavy steel scrap are increasing the use of scrap in their open hearth mixtures, owing to the fact that it is about \$10 per ton cheaper than basic iron.

Heavy steel, melting, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$25.00 to \$25.50
No. 1 cast for steel plants	30.00 to 31.00
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Franklin, Pa., and Pittsburgh	31.00 to 32.00
Compressed steel	21.00 to 22.00
Bundled sheet sides and ends, f.o.b. consumers' mills, Pittsburgh district	18.00 to 19.00
Bundled steel stamping	16.50 to 17.00
No. 1 busheling	24.00 to 25.00
Railroad grate bars	21.50 to 22.00
Low phosphorus melting stock (bloom and billet ends, heavy plates) 3/4 in. and heavier	29.00 to 30.00
Railroad malleable	24.00 to 25.00
Iron car axles	34.00 to 35.00
Locomotive axles, steel	33.00 to 34.00
Steel car axles	31.00 to 32.00
Railroad malleable	24.00 to 25.00
Cast iron wheels	31.00 to 32.00
Rolled steel wheels	27.00 to 28.00
Machine-shop turnings	15.00 to 16.00
Sheet bar, crop ends (at origin)	29.00 to 30.00
Heavy breakable cast	23.00 to 24.00
Cast iron borings	19.00 to 20.00
No. 1 railroad wrought	27.00 to 28.00

Cleveland

CLEVELAND, Dec. 23.

Iron Ore.—Little consideration is as yet being given to ore prices for next year, and it is not expected that the buying movement will start for some time. Shipments from docks are light. Prices f.o.b. lower Lake ports, follow:

Old range Bessemer, \$6.45; old range, non-Bessemer, \$5.70; Mesaba Bessemer, \$6.20; Mesaba non-Bessemer, \$5.55.

Pig Iron.—The foundry trade is apparently well covered, for its early requirements and inquiry has fallen off considerably. Very little Northern foundry iron is available, and there is a disposition among some producers who are not sold up for the first quarter to take early shipment orders in order to secure the advantage of any further advance in prices. However, some producers are opposed to further advances. An active demand for early shipment foundry iron is expected after the first of the year, as some furnaces will be far behind on shipments because of delays caused by the steel strike. Foundry iron has sold at \$38.50 for No. 2 for early shipment, but \$38 is recognized as the market price. A 5000-ton lot of Southern resale iron sold recently for export to Italy was disposed of quickly at \$37 furnace and some Southern iron is now being offered at \$38 furnace for No. 2, but only for prompt shipment. Virginia foundry iron is being offered in this market at the same price.

Basic	\$35.40
Northern No. 2 foundry, silicon 1.75 to 2.25	38.40
Southern foundry, silicon 2.25 to 2.75	42.35
Gray forge	37.40
Ohio silvery, silicon 8 per cent.	52.40
Standard low phos., Valley furnace	\$43.00 to 44.00

Finished Iron and Steel.—The demand for steel continues very heavy. Some mills are trying their best to take care of their regular trade, but others will take on no additional tonnage until they have partially caught up on orders now on their books. While some consumers are apparently attempting to anticipate their requirements, most of the tonnage that is coming up is for actual first quarter requirements. Plates are moving freely at 3c. Eastern mill and as high as 3.25c. is being asked. The structural situation is growing tighter. Some mills are declining to protect fabricators who are bidding on work, but others will accept orders without delivery promises. Some light plate

and sheet business is being taken subject to prices prevailing at time of shipment. With higher prices for semi-finished steel, plate and sheet mills not having their own supply will not quote present prices for future delivery and may take some action shortly toward advancing prices. Rerolling mills are well sold up on hard steel bars on which quotations now range from 3c. to 3 1/2c.

Steel bars, 3.25c.; plates, 3.57c.; structural shapes, 3.37c.; bands and hoops, 3.97c.; No. 10 blue annealed sheets, 4.27c.; No. 28 black sheets, 5.27c.; No. 28 galvanized sheets, 6.62c.

Coke.—The coke market is inactive. Foundries have been crowding producers for deliveries and the temporary scarcity due to the curtailment of production is being relieved.

Ferroalloys.—The price of ferromanganese has been advanced to \$130 delivered for domestic and to \$125 c.i.f. for English for the second quarter delivery, none being available for earlier deliveries.

High-Speed Tool Steel.—Users of high-speed tool steel are getting their old stocks cleaned up and are coming into the market for contracts. Unusually keen competition has developed, which has brought quotations down to as low as \$1 per lb. The regular price for contracts is 10 per cent off the current delivery price of \$1.40.

Bolts, Nuts and Rivets.—There is a heavy demand for bolts, nuts and rivets, but the output is curtailed. Local rivet prices have been advanced to \$4.15 for structural and \$4.25 for boiler rivets, sales being limited to the first quarter. Most consumers were covered for that delivery before the \$5 advance. Premium prices are common on bolts and nuts because of the scarcity.

Old Material.—Weakness has developed in the scrap market, although heavy melting steel is slightly higher due to some buying by local dealers, one lot moving at \$23.50. Rerolling rails have advanced, 800 tons sold by the Nickel Plate Railroad last week bringing about \$34. We note sales of turnings to Valley dealers at \$14.50. Borings are lifeless and cast scrap active.

Heavy melting steel	\$21.00 to \$21.50
Steel rails, under 3 ft.	25.00 to 26.00
Steel rails, rerolling	32.75 to 33.50
Iron rails	29.00 to 30.00
Iron car axles	39.00 to 40.00
Steel car axles	34.00 to 35.00
Low phosphorus melting scrap	23.00 to 23.50
Cast borings	15.00 to 15.50
Iron and steel turnings and drillings	13.00 to 13.50
Short turnings (for blast furnaces)	14.00 to 14.50
Compressed steel	17.75 to 18.00
No. 1 railroad wrought	22.00 to 23.00
Railroad malleable	26.00 to 27.00
Agricultural malleable	21.00 to 22.00
Steel axle turnings	17.00 to 17.50
Light bundled sheet scrap	14.50 to 15.00
No. 1 cast	29.50 to 30.00
No. 1 busheling	20.00 to 21.00
Drop forge flashings, 10 in. and under	18.50 to 19.50
Drop forge flashings, over 10 in.	16.50 to 17.00
Railroad grate bars	25.00 to 25.50
Stove plate	25.50 to 26.50

Buffalo

BUFFALO, Dec. 22.

Pig Iron.—The market has been rather quiet the past week compared with recent rush demand, the interest on the part of buyers having subsided temporarily on the approach of the holiday season. A firm tone is preserved, however, with a stiffening tendency in prices. Very little iron is left uncontracted for available for first half delivery and even with the holiday lull in inquiry, demand is far in excess of supply. One large producer still has three stacks out of service and they will not be started up until the supply of coke is more plentiful. The furnace interest that has the largest unfilled capacity available for first half, has advanced its prices during the week to \$40 base, f. o. b. furnace, for 1.75 to 2.25 silicon; \$41.25 for 2.25 to 2.75 and \$43 for 2.75 to 3.25. Other furnace interests have no increased prices over last week's schedule, but have practically nothing left to sell and are not looking for additional business, and indications are that there is likely to be an acute shortage of iron during the first half. One producer, however, reports

sale of a small tonnage of first half 2.75 to 3.25 silicon iron at \$41, and a small tonnage of malleable at \$39.25. We quote as follows, f. o. b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon..	\$41.00 to \$43.00
No. 2 X, 2.25 to 2.75 silicon.....	39.25 to 41.25
No. 2 plain foundry, 1.75 to 2.25 sil...	38.00 to 40.00
Malleable, silicon not over 2.25.....	39.25
Basic	36.00
Lake Superior charcoal, regular grades, f.o.b.	
Buffalo	42.60

No effort is being made by furnaces to negotiate third quarter iron owing to probable increased costs in production, but the producing interest that has some untaken first half capacity, has taken on a few small tonnages of third quarter, foundry grades, at its present advanced schedule.

Finished Iron and Steel.—The situation remains about the same as a week ago, with very large demand for all finished products. Mills and agencies are only taking orders from regular customers, allowing such customers their average proportion of purchases computed on the basis of the annual total of the past three or four years, and declining to take any larger tonnages than the pro rata monthly average of such given period. Some sellers have not opened their books for first quarter of next year. It is becoming very clear that some agencies will have very little new material to offer for sale inside of the next 30 or 60 days.

Old Material.—The market continues very strong with active inquiry, and dealers are preparing for heavy buying after the first of the year and for an advance in prices on all commodities. Stocks are apparently being held by dealers for the higher prices anticipated, and the prices shown in the current schedule for the week represent very light trading. It is doubtful whether any large tonnage could be secured now at the figures named in this schedule. We quote as follows per gross ton f. o. b. Buffalo:

Heavy melting steel, regular grades..	\$23.00 to \$23.50
Low phosphorus, 0.04 and under....	27.00 to 28.00
No. 1 railroad wrought.....	28.00 to 29.00
No. 1 machinery cast.....	30.00 to 31.00
Iron axles	35.00
Steel axles	35.00
Car wheels	32.00 to 33.00
Railroad malleable	24.00 to 25.00
Machine-shop turnings	14.00 to 15.00
Heavy axle turnings.....	19.50 to 20.00
Clean cast borings.....	19.00 to 20.00
Iron rails	28.00 to 29.00
Locomotive grate bars.....	22.50 to 23.00
Stove plate	24.00 to 24.50
Wrought pipe	19.00 to 20.00
No. 1 busheling.....	20.00 to 21.00
Bundled sheet stamping.....	16.00 to 17.00

Cincinnati

CINCINNATI, Dec. 23.

Pig Iron.—Sales of pig iron in this territory during the past week have been very small, consisting mostly of carload lots for prompt shipment. A southern Ohio concern has an inquiry out for 2000 tons of No. 2 foundry for first half shipment, but the order has not been placed. Spot iron has practically disappeared from the market and operators are hesitant about opening their books for future delivery, as they expect a brisk demand shortly after New Year's from foundries which have not contracted for first quarter needs. The market is very firm with a tendency to higher prices. A number of sales of high silicon Southern iron have been made at prices equivalent to \$38 base. Prices range anywhere from \$35 to \$38, Birmingham, for No. 2, but it is extremely doubtful whether any can be had at the former figure. The inquiry for southern Ohio iron is also heavy and one interest reports some small sales for first quarter shipment at \$39.75, Ironton. The same interest reported sales of 3000 tons of basic for Eastern delivery. The price was not disclosed. While one local seller of Northern iron opened his books for a short period early in the week, and after disposing of the quantity desired, withdrew from the market, the policy adopted at present seems to be one of watchful waiting, and until the holidays are over it will be very difficult to get a line on the situation.

Based on freight rates of \$3.60 from Birmingham and \$1.80 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, silicon 1.75 to 2.25	
(base price)	\$39.60
Southern coke, silicon 2.25 to 2.75	
(No. 2 soft)	41.00
Ohio silvery, 8 per cent silicon.....	51.80
Southern Ohio coke, silicon 1.75 to 2.25 (No. 2)	38.55
Basic, Northern	36.05
Standard Southern car wheel.....	48.60
Malleable	39.05

Finished Material.—The demand for finished products still continues brisk, and with the ending of the coal strike and the fact that the steel strike is practically over as far as the mills are concerned, production is gradually picking up. Sheets are still in great demand and buyers are scouring the country for them.

Old Material.—The scrap market is very strong and prices have again gone up. Foundry stocks are very low and stocks in dealers' yards are not large.

Per Gross Ton

Bundled sheet	\$15.00 to \$16.00
Old iron rails.....	26.00 to 27.00
Relaying rails, 50 lb. and up.....	42.00 to 43.00
Rerolling steel rails.....	26.00 to 27.00
Heavy melting steel.....	20.00 to 21.00
Steel rails for melting.....	22.00 to 23.00
Old car wheels	24.00 to 25.00
No. 1 railroad wrought.....	21.00 to 22.00

Per Net Ton

Cast borings	\$11.50 to \$12.00
Steel turnings	11.00 to 11.50
Railroad cast	27.00 to 28.00
No. 1 machinery.....	30.00 to 31.00
Burnt scrap	17.00 to 18.00
Iron axles	28.50 to 29.00
Locomotive tires (smooth inside)....	21.50 to 22.50
Pipes and flues.....	16.00 to 16.50
Malleable cast	19.50 to 20.00
Railroad tank and sheet.....	15.00 to 15.50

Birmingham

BIRMINGHAM, ALA., Dec. 22.

At the close of the week ending Dec. 20 Birmingham pig iron had advanced another dollar to \$36, that being the new minimum. Sales were made at that figure in the regular run of business and without solicitation. No producer was actively in the market, nor cares to be with the advancing tendency still in play. It is reliably reported that a Northern Alabama stack has sold more or less iron at \$40 and that is its price. Others are reaching to that mark. A large pipe interest sounded the market on last Saturday for spot metal and found nothing under \$36. Inquiry is not very brisk, due to the attitude of the selling interests, whose agents have been called off. All handicaps being removed, production will be increased. The Sloss-Sheffield Co. blew in its banked Hattie Ensley at Sheffield on Dec. 18. The Woodward Iron Co., as the railroads are no longer diverting its coal supply, is in a position to relight at the idle Vanderbilt stacks. Jenifer, which banked two weeks ago, will probably resume early in January. There is no labor trouble of any kind in the Birmingham district, and the home melt of iron bids fair to attain new maximums. The year's output of Alabama stacks will not be over 2,220,000 tons, which will be over 300,000 tons less than the output of 1918, 700,000 tons under that of 1917, and 500,000 tons under that of 1916. Yards will come to 1920 with not over 70,000 tons of foundry. The strategic position from a stock standpoint is exceedingly strong.

We quote per gross ton f. o. b. Birmingham district furnaces as follows:

Foundry, silicon	\$36.00
Basic	35.00

Cast Iron Pipe.—The pipe makers have a demand for capacity output. Sanitary shops will close for the holidays according to custom. Sanitary pipe makers are cautious in booking orders for 1920 on account of uncertainty as to pig iron prices. Current quotations are \$59 for 4 in., and \$56 for 6 in. and upwards. The National Cast Iron Pipe Co., Birmingham, has voted and placed \$250,000 of long-time bonds with the Mortgage & Securities Co., indicating plant extension.

Coal and Coke.—Peace hovers over the Alabama coal region except as to complaints that some com-

panies will not take back agitators. Production is again normal. Coke has become sufficient for all local needs and movements to Mexican and Texas smelters are again taking place. Prices remain at \$9 contract and \$9.50 for spot.

Old Material.—The old material market is doing a fairly brisk business in both steel and cast iron, the latter being strong in place of high-priced pig iron. Yardmen are seeking replenishment of stocks. Prices are stronger. We quote per gross ton f. o. b. Birmingham district yards, prices to consumers, as follows:

Steel rails	\$21.00 to \$22.50
No. 1 heavy steel	20.00 to 21.00
Cast iron borings	14.00 to 15.00
Machine-shop turnings	14.00 to 15.00
Stove plate	24.00 to 25.00
No. 1 cast	26.50 to 27.50
Car wheels	26.50 to 27.50
Tramcar wheels	25.50 to 26.50
Steel axles	29.00 to 30.00
No. 1 wrought	24.00 to 25.00

St. Louis

ST. LOUIS, Dec. 22.

Pig Iron.—The aggregate of the demand from relatively small purchasers of pig iron continues large, but furnace representatives are unable to accommodate them, as the producers are still unwilling to take orders. There is, therefore, an accumulation of customers who want first and second quarter delivery, but cannot be taken care of. Representatives generally are waiting for the furnaces to permit them to book orders, but do not expect any release until toward the middle of January. Some warrant iron offered from Philadelphia appeared in the market on a basis of \$36.50 per ton Birmingham, to which seller's commission must be added, but so far as known, no sales of consequence took place during the week. No. 2 Southern Iron is nominally held at \$36 per ton Birmingham, but as no orders are being accepted, this quotation means nothing. Northern iron is quoted at \$38.75 per ton Iron-ton, basis of 1.75 to 2.25 silicon. Big buyers of pig iron or basic are still out of the market.

Coke.—Deliveries of coke on contract are improving and rapidly approaching normal, with considerable catching up on delayed shipments due to the coal strike. On all contracts under the Government's fixed price, 45c to 60c per ton is being added to cover the increased cost due to the advance in coal miners' wages.

Finished Iron and Steel.—While deliveries of finished products are slowly improving, mill representatives still decline to make promises. Nothing better than second quarter can be done on bars with structural material and plates running four to six weeks delivery. Track fastenings are generally six to eight weeks behind. While shipments are improving, the acceptance of new orders, which are looked forward to after the first of the year, will undoubtedly contribute to a continuance of delays. There is some disposition to pay premiums on the part of buyers, but the large mills will not accept this inducement, and such cases as are reported are those of small producers of the finished product. Movement out of warehouse continues heavier than the available supply of material, and while there has been some improvement in the receipt of finished material, the demand is such as to dispose of most of the material before it is received. For stock out of warehouse, we quote as follows:

Soft steel bars, 3.44c.; iron bars, 3.44c.; structural material, 3.54c.; tank plates, 3.74c.; No. 10 blue annealed sheets, 4.89c.; No. 28 black sheets, cold rolled, one pass, 5.99c.; No. 28 galvanized sheets, black sheet gage, 7.34c.

Old Material.—The scrap market has developed increased activity since the conclusion of the coal strike, and there has been heavy buying, on the part of both the consumers and also the dealers who have been speculating, or are now short on contracts. The rolling mills, foundries, and steel mills have all been in the market during the week, with the result that prices have been moved up. Old car-wheels have been in particularly strong demand with none offered, and

much the same situation is reported in all cast-iron grades. No railroad lists appeared during the week, and none are now expected until after the first of the year. We quote dealers' prices, F. O. B. consumer's works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$27.50 to \$28.00
Old steel rails, rerolling	32.50 to 33.00
Old steel rails, less than 3 ft.	25.00 to 25.50
Relaying rails, standard sections, subject to inspection	38.00 to 45.00
Old car wheels	29.50 to 30.00
No. 1 railroad heavy melting steel	23.50 to 24.00
Heavy shoveling steel	21.50 to 22.00
Ordinary shoveling steel	21.00 to 21.50
Frogs, switches and guards, cut apart	25.00 to 25.50
Ordinary bundled sheets	13.50 to 14.00
Heavy axle and tire turnings	17.00 to 17.50

Per Net Ton	
Iron angle bars	25.50 to 26.00
Steel angle bars	21.50 to 22.00
Iron car axles	34.50 to 35.00
Steel car axles	33.50 to 34.00
Wrought arch bars and transoms	28.00 to 28.50
No. 1 railroad wrought	23.00 to 23.50
No. 2 railroad wrought	22.00 to 22.50
Railroad springs	22.00 to 22.50
Steel couplers and knuckles	22.00 to 22.50
Locomotive tires, 42 in. and over, smooth inside	21.00 to 21.50
No. 1 dealers' forge	20.50 to 21.00
Cast iron borings	11.50 to 12.00
No. 1 busheling	22.00 to 22.50
No. 1 boiler, cut to sheets and rings	17.00 to 17.50
No. 1 railroad cast	30.00 to 30.50
Stove plate and light cast	27.00 to 27.50
Railroad malleable	23.00 to 23.50
Agricultural malleable	22.50 to 23.00
Pipes and flues	18.50 to 19.00
Heavy railroad sheet and tank	17.50 to 18.00
Railroad grate bars	26.50 to 27.50
Machine-shop turnings	13.00 to 13.50
Country mixed	19.00 to 19.50
Uncut railroad mixed	20.00 to 21.00
Horseshoes	22.50 to 23.00

New York

NEW YORK, Dec. 23.

Pig Iron.—Volume of inquiries and orders has slackened for two possible reasons: The holiday season which has a psychological influence, and the abatement of what one seller terms "hysteria," or the fear which existed two or three weeks ago on the part of buyers lest the coal strike create a panic for iron. Price tendency is ever upward, though the tendency, if there is one, is not as marked as during the few weeks previous. Conditions are still very unusual as evidenced by the difficulty of deciding what the market price is, and by the shipments into districts where sales would be normally the least expected, as for instance, the sale of Eastern Pennsylvania foundry iron into territory formerly practically monopolized by Buffalo furnaces. Iron, silicon 2.25 to 2.75, is commonly sold in small tonnages from \$40 to \$42, furnace, though sales as high as \$43 are recorded. One New York agent disposed of a considerable tonnage of iron, silicon 3.25 for \$44 or \$45, furnace. Sales of several thousand tons each of basic and gray forge Eastern Pennsylvania iron are reported at \$38, furnace, it being explained that this is the logical price when it is considered that foundry iron is selling at over \$40. Several report inquiries for last half delivery, but these inquiries are usually disregarded in view of the uncertain costs of the future.

No. 1 foundry, silicon 2.75 to 3.25	\$42.80 to \$43.80
No. 2X, silicon 2.25 to 2.75	41.80 to 42.80
No. 2 plain, silicon 1.75 to 2.25	40.80 to 41.80
No. 2 X, Virginia, silicon 2.25 to 2.75	43.40

Ferrolloys.—After making fairly heavy sales of ferromanganese for early and first quarter delivery at \$120, delivered, domestic producers late last week advanced their quotations generally to \$130. Demand is light, but the price tendency is strong. Very little British alloy is available. One representative of British makers still has 1000 tons available for delivery in the second quarter at a minimum of \$120, seaboard, while another is authorized to nominally quote \$125, seaboard. Spiegeleisen is quiet but strong at a minimum of \$40, furnace, for the 19 to 20 per cent grade. There is still under negotiation 10,000 tons for foreign delivery, mostly for Holland and Belgium. One Belgian order is for 2500 tons of 9 to 11 per cent alloy. The 50 per cent ferrosilicon market is quiet at \$80 to \$85 per ton, delivered.

Finished Iron and Steel.—One of the significant developments has been the purchase of 100 passenger cars

by the Long Island Railroad without the payment of any money. Car trust certificates have been issued for 80 per cent of the cost, payable in 10 years, and for the remaining 20 per cent notes have been given, payable in annual installments, for 10 years. About 1100 tons of steel is involved, covering 50 trailer cars, 30 steam coaches and 20 motor cars, and the car equipment manufacturers have accepted the same basis of payment as the car builder, the American Car & Foundry Co. The Belgian locomotives, reported last week, will be paid for in five-year notes, which it is understood are not to be negotiated but may be used as collateral. It is understood that the steel plates have now all been bought and at below 3c., and for shipment probably within two months. Against this may be named repeated instances of 3c. and higher for early delivery plates, one lot of about 50 tons of universal plates selling at 3.40c., New York, for export, and 600 tons of ship plates at 3c., Pittsburgh. A local fabricator claims to have bought 500 tons of universal plates on contract, delivery not known, at 2.65c., Pittsburgh. The general situation as to prices as the new year approaches, appears as follows: The few large mills which are booked fully for the first quarter and have not yet entertained second quarter business, will, it is believed, ask 2.50c., Pittsburgh basis, for steel bars, 2.55c. for shapes, and 2.75c. for plates, and then take care only of preferred customers. Such mills are inclined to believe that the present existing minimum prices available only for indefinite delivery will rise soon to the levels named. Fabricated steel activity is sustained. The Bridge Builders and Structural Society's report shows that November, at upward of 125,000 tons total fabricated business, is not much below the average of the second half of the year so far, which is 136,000 tons monthly. There is much unsatisfied export demand which could be covered at high prices if the material were obtainable, and besides the large needs of the railroads, jobbers and manufacturing consumers have low stocks.

We quote for mill shipment, New York, as follows: Soft steel bars 2.62c. to 3.27c.; shapes, 2.72c. to 2.82c.; plates, 2.92c. to 3.27c., the minimum prices being for indefinite delivery and the higher prices for the first quarter; bar iron, flats, wider than 6 in., 4.07c.; $\frac{3}{4}$ and 7/16 in. round and square, 4.47c., light rounds, squares and flats, 4.77c., and other sizes, 3.77c.

Cast Iron Pipe.—Orders are pouring in and prices remain very firm. Among the bids submitted to the city of Newark, N. J., for 2200 tons of 24-in. pipe, the Warren Foundry & Machine Co. was low bidder, but the award has not yet been made. The recent asking of the city of New York has not yet culminated in a contract because it was found that not enough money had been appropriated, but arrangements are expected to be made in the near future. We quote 6-in. and heavier at \$62.30, New York; 4-in., \$65.30, with \$2 additional for Class A and gas pipe.

Old Material.—Prices have advanced from \$1 to \$2 a ton in a week on all the most common grades. Cast scrap is particularly strong, No. 1 machinery having sold near by as high as \$35, delivered. Those grades showing the most marked advance are rerolling rails, steel car axles, and locomotive grate bars. Prices which dealers and brokers are paying, New York, per gross ton follow:

Heavy melting steel.....	\$20.00 to \$20.50
Rerolling rails.....	29.00 to 30.00
Relaying rails, nominal.....	47.00 to 48.00
Steel car axles.....	30.00 to 31.00
Iron car axles.....	47.00 to 41.00
No. 1 railroad wrought.....	28.00 to 29.00
Wrought iron track.....	20.00 to 20.50
Forge fire.....	16.50 to 17.00
No. 1 yard wrought, long.....	22.00 to 23.00
Light iron.....	7.00 to 8.00
Cast borings (clean).....	17.00 to 17.50
Machine-shop turnings.....	15.00 to 15.50
Mixed borings and turnings.....	14.00 to 14.50
Iron and steel pipe (1 in. min. diam., not under 2 ft. long).....	19.00 to 19.50
Stove plate.....	21.00 to 22.00
Locomotive grate bars.....	24.00 to 25.00
Malleable cast (railroad).....	23.00 to 23.50
Old carwheels.....	30.00 to 31.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton:

No. 1 machinery cast.....	\$32.00 to \$33.00
No. 1 heavy cast (columns, building materials, etc.), cupola size.....	31.00 to 32.00
No. 1 heavy cast, not cupola size.....	24.50 to 25.00
No. 2 cast (radiators, cast boilers, etc.).....	23.00 to 24.00

Boston

BOSTON, Dec. 23.

Pig Iron.—Sales of silicon 1.75 to 2.25 and 2.25 to 2.75 iron during the past week were smaller than those for any corresponding period during the past two months. The most active house here did not take orders for more than 1000 tons. The comparative inactivity is not due so much to a lack of demand as to lack of offerings. There have, however, been sales of several thousand tons of special iron, mostly high in silicon and having varying sulphur and manganese content at prices that cannot be considered basic. Some 800 tons of Eastern Pennsylvania silicon first quarter delivery has sold to textile machinery interests at \$40 furnace, and individual car-lots have brought as high as \$41. A car of silicon 3 to 3.25 was bought by a Connecticut consumer at \$42 furnace, and another car, silicon 2.50 and higher, to a Boston consumer at \$43, both sales being for immediate delivery. A Massachusetts consumer bought 100 tons Western Pennsylvania, silicon 2.75 to 3.25, at \$42 furnace, with a freight rate of more than \$5 a ton, first quarter delivery. No important sales of Buffalo iron are reported on this market. One grade is reported as being offered on a \$39 furnace base for silicon 2.25 to 2.75, first half delivery by a steel company itself, and resale iron of the company for \$1 a ton less. A buyer also reports being offered second half iron on a first half basis, the name of the furnace being withheld. The reports cannot be verified. Sales of Virginia iron since last reports have been confined to special silicon content and at private terms. No Alabama tonnage of importance has been offered here.

Eastern Pa., No. 2 X, silicon 2.25 to 2.75.....	\$41.90 to \$42.90
Eastern Pa., No. 2 plain, silicon 1.75 to 2.25.....	40.90 to 41.90
Buffalo, No. 2 X, silicon 2.25 to 2.75.....	41.90 to 42.90
Buffalo, No. 2 plain, silicon 1.75 to 2.25.....	40.90 to 41.90
Virginia, No. 2 X, silicon 2.25 to 2.75.....	43.95 to 44.95
Virginia, No. 2 plain, silicon 1.75 to 2.25.....	42.70 to 43.70
Alabama, No. 2 X, silicon 2.25 to 2.75.....	46.00
Alabama, No. 2 plain, sil. 1.75 to 2.25.....	44.60

Coke.—The feature of the coke market since last reports has been the decided improvement in deliveries. The New England Coal & Coke Co. is now in a position to accept orders for spot shipment. The bulk of the foundries, however, are well covered on requirements. The market is reported as very firm on a \$11.90 delivered base.

Cast Iron Pipe.—The local resale market on steel pipe is very strong and stocks are badly broken owing to light receipts from the mills during the past month or two and the increase in all kinds of construction work throughout New England. One and 2-in. pipe is especially short. The wrought iron pipe situation practically is the same as that of steel. Pipe mill representatives here report being offered premiums of \$5 per ton for first quarter deliveries.

Warehouse Business.—In some instances local warehouses report slightly better receipts from the mills, but the supply situation as a whole remains very unsatisfactory. All kinds of bars are in urgent request, and some sizes exceptionally difficult to obtain. There has been more than sufficient call for concrete bars to absorb fresh stock as fast as it arrives. Substitution of iron for steel is still commonly practised. All kinds of sheets and plates are obtainable only in very small lots. Stocks of bolts and nuts continue badly broken. Some local warehouse interests are asking \$5, \$5.50 and \$6 base for wire nails whenever they have anything to sell.

Jobbers quote: Steel bars, cold rolled rounds, \$5.50 per 100 lb. base; squares, hexagons, flats, \$6 base; soft steel, flats, rounds, squares, \$4 base; concrete bars, plain round, square, \$4; twisted squares, \$4.50; structural steel under 3 in., \$4; structural, 3 in. and over, \$3.75; tire steel, \$4.70; spring steel, open hearth, \$8.50; special, \$12.50; toe calk steel, \$6; steel hoops, \$5.45; steel bands, \$5.20; iron, refined, except as follows, \$4.10 base; $\frac{3}{4}$ in., 9/16 in. round, square and 2 $\frac{3}{4}$ in. round, square and larger, \$4.50 base; 7/16 in. round, square and smaller, \$5.50 base; over 6 in. wide, \$5.50 base, best refined iron, \$5.50 base; Wayne iron, \$7 base; band iron, \$5.20; hoop iron, \$5.45; Norway iron, \$20; No. 10 blue annealed sheets, \$5.30 base; No. 28 black sheets, \$7.65; No. 28 galvanized sheets, \$8.50; plates, \$3.95 base.

Finished Iron and Steel.—Very little new business is being booked by local mill representatives for rods,

sheets, bolts, nuts, etc. That the supply situation has grown more acute is shown by the premiums being offered for stock and the willingness of buyers to accept goods at any price. The Riverside Boiler Works, Inc., is in the market for 1800 tons of black sheets, first half delivery, but has been unable to contract at any price. A Springfield plant will take 1500 tons of forging steel, first quarter delivery, at almost any price. There is a much better demand for plates with premiums offered in some instances. One local representative is still quoting on a \$3.00 to \$3.25 Pittsburgh base, but the others have not met this price. Among the contracts placed this week have been 800 tons to a car repair plant, first quarter delivery; 300 tons to a new England railroad for bridge work, first quarter delivery; 1500 tons for a New York State water project, first quarter delivery. The demand for structural has taken a spurt, contractors desiring to cover themselves in anticipation of higher prices. The New England Structural Steel Co. has been awarded 2500 tons for the First National Bank Building, Boston. Other contracts include 321 tons for an East Cambridge soap works, 150 tons for an East Bridgewater power station. Bids are in on 1600 tons for a Hartford, Conn., electric plant. Bids will soon be asked on 3500 tons for the John Hancock Building, Boston, and on a power plant job at Lowell which involves several hundred tons.

Old Material.—Aside from a decline in turnings due to the closing down of some consuming plants, prices for old material as quoted on this market remain unchanged notwithstanding a noticeable decrease in the demand. Markets at New England points outside Boston are not as strong as local conditions appear to warrant, but the spread in quotations is hardly noticeable. The market on turnings today is \$13 to \$13.50, whereas a week ago it was \$13.50 to \$14. A Boston consumer has bought a small tonnage of No. 1 machinery cast at \$35 delivered, and a large majority of the other sales made during the past week have been practically on that basis. People are asking \$17 at the mill for cast iron borings.

No. 1 heavy melting steel.....	\$17.00 to \$18.00
No. 1 railroad wrought.....	24.50 to 25.00
No. 1 yard wrought.....	22.00
Wrought pipe (1 in. in diameter, over 2 ft. long).....	17.00 to 18.00
Machine-shop turnings	13.00 to 13.50
Cast iron borings	16.00 to 17.50
Heavy axle turnings.....	15.50 to 16.00
Blast furnace borings and turnings..	12.50 to 13.00
Forge scrap	13.50 to 14.00
Bundled skeleton	13.50 to 14.50
Steel car axles.....	27.00 to 28.00
Car wheels	28.00 to 29.00
Machinery cast	32.00 to 33.00
No. 2 cast.....	29.00 to 30.00
Stove plate	21.00 to 22.00
Railroad malleable	20.00
Rerolling rails	27.50 to 28.50

Philadelphia

PHILADELPHIA, Dec. 23.

The steel price situation is giving some of the steel companies concern. While there have been advances, there apparently is no desire anywhere among sellers to precipitate a runaway market, and this is the prevailing attitude of the independents as well as the leading interest. The pressure from buyers, however, is very heavy, and many of the high prices which have been quoted, and which have unexpectedly been accepted by consumers, were named to discourage business. A new price level for 1920 seems certain despite the efforts of the leading interest to maintain prices at the level adopted by the trade last March 21. In many lines the leading interest has nothing to sell for delivery within three to six months, so its quotations are in some instances not representative of the present market. As an example, there is its last week quotation of 2.50c., Pittsburgh, on 10,000 tons of plates for the Navy Department, while the bulk of present business is being done at 3c. to 3.25c., Pittsburgh. Steel bars are scarcely to be had at any price, but 3c., Pittsburgh, appears to be the minimum for fairly prompt delivery. Sheets, wire products and pipe are almost unobtainable at any price for first half shipment. A local mill is quoting 4.05c., Pittsburgh, on blue annealed sheets,

an advance of \$10 a ton over the March 21 schedule. A Buffalo mill is offering limited tonnages of plates, shapes and bars to regular customers for second quarter shipment only, having nothing to offer for first quarter. Its prices are 2.50c. for bars, 2.60c. for shapes and 2.75c. for plates.

In pig iron there is not the effort to restrain prices that is noted in the steel trade, and advances are being recorded almost every week. A sale of basic has been made at \$40, delivered, eastern Pennsylvania. Gray forge iron has sold at nearly the same level and foundry iron continues firmly at around \$40, furnace, for No. 2 X. The fuel supply is so uncertain and the supply of iron is so far short of potential demands that higher prices are predicted.

Fully 100,000 tons of plates has been offered to Eastern mills in the last week and additional large plate business is in prospect. Very little of this business will come to this district owing to the sold-up conditions of the mills.

Pig Iron.—The market continues strong in tone, with prices on the up grade. Eastern Pennsylvania foundry iron is firm at \$40, furnace, for No. 2 X, 2.25 to 2.75 per cent silicon, and about \$1 less for No. 2 plain. Virginia foundry iron has been sold the past week at prices ranging from \$38 to \$40, furnace, for No. 2 plain, with \$1.25 added for No. 2 X. Consumers are not going hungry for iron and at the present time there is probably slightly more foundry iron available for prompt delivery than is demanded, but the supply will no doubt be quickly absorbed when more active buying is resumed after the holidays. The latest reported transaction in basic involved a fair-sized tonnage at \$40, delivered, but another maker offers 2000 tons at \$38, delivered. Sales aggregating 4200 tons of gray forge iron have been made by one seller at \$39, furnace. Malleable iron has also brought higher prices, namely, \$38 to \$39, furnace. Low phosphorus iron, copper free, has lately been quoted at \$45, furnace, but a transaction at \$46 is under negotiation at this writing and probably will be closed this week. Copper-bearing low phosphorus iron is firm at \$40, furnace, with few transactions. There is no disposition among furnace operators to sell iron ahead under existing uncertain conditions as to fuel supply. Some furnaces are sold up for months and their owners regard it as extremely unwise to take on further commitments. The removal of restrictions on coke manufacture has by no means solved the fuel problem. A car shortage now complicates the situation and some furnace operators are apprehensive lest they be forced to bank their stacks.

The following quotations are for iron delivered in consumers' yards in Philadelphia or vicinity, except those for low phosphorus iron, which are f.o.b. furnace:

Eastern Penn., No. 2X, 2.25 to 2.75 sil	\$41.10 to \$42.80
Eastern Penna., No. 2 plain, 1.75 to 2.25 sil	40.10 to 41.80
Virginia No. 2X, 2.25 to 2.75 sil..	43.35 to 45.35
Virginia No. 2 plain, 1.75 to 2.25 sil..	43.10 to 44.10
Basic deliv. Eastern Pa.....	38.00 to 40.00
Gray forge	39.40
Standard low phosphorus (f.o.b. furnace)	45.00 to 46.00
Malleable	38.60 to 39.60
Copper bearing low phosphorus (f.o.b. furnace)	40.00

Ferroalloys.—Domestic makers of ferromanganese are now quoting \$130, delivered, and have taken business at this price. Some of the British agents are quoting the same price at seaboard, but only for limited tonnages for delivery in second and third quarters. Spiegeleisen is now quite generally quoted at \$40, furnace.

Semi-Finished Steel.—Open-hearth rerolling billets continue on the basis of \$54, Philadelphia, from Eastern mills, while \$65 is the ruling quotation on forging billets, plus the \$4 freight rate from Pittsburgh. The Pennsylvania Railroad is receiving bids to-day on 1000 to 2000 tons of forging billets for first half shipment.

Plates.—A large tonnage of plates is pressing for acceptance, shipbuilders being the principal inquirers. One Seattle shipyard is asking for 40,000 tons for the first half, another Seattle shipyard wants 34,000 tons for delivery in the same period; a large Eastern shipbuilding corporation with several yards wants 14,000 tons, and smaller tonnages are involved in inquiries

from other yards. A Bristol, Pa., shipbuilding company has bought 15,000 tons of plates from Carnegie Steel Co. The Sun Shipbuilding Co., Chester, Pa., has received contracts for 17 ships, but orders for steel were placed some time ago. In addition the locomotive companies are in the market for plates, the local company having taken an order for 75 locomotives for Belgium and 55 other engines are also to be built. The Sinclair oil interests have a large program which it is said will require about 100,000 tons of plates, as many new ships and tanks are to be built. On 10,000 tons of plates for the League Island Navy Yard the Carnegie Steel Co. bid 2.50c., Pittsburgh, which is identical with its quotation on other recent Navy business. Some other steel companies bid 3c., Pittsburgh. The prevailing quotations on plates for nearby delivery are 3c. to 3.25c., Pittsburgh. One company is accepting contracts for 1920 at 3.25c., Pittsburgh, with the understanding that specifications must be received in first quarter for shipment at mill convenience. For second quarter 2.75c., Pittsburgh, has been quoted by one mill to its regular customers, but it has none to sell for first quarter. We quote sheared plates, $\frac{1}{4}$ in. and heavier, at 3.245c. to 3.495c., Philadelphia.

Structural Material.—There is more business in structural shapes being offered to Eastern mills than they care to accept. The price asked by two or more mills is 2.55c., Pittsburgh, but more could easily be obtained, if prompt delivery could be assured. A Buffalo mill is asking 2.60c., Pittsburgh, on contracts for second quarter, but it is selling only limited tonnages to regular customers. It has nothing to offer for first quarter delivery. Deliveries on good-sized tonnages are three months or longer in some instances. We quote plain material at 2.795c., Philadelphia.

Old Material.—The Bethlehem Steel Co. has bought from 10,000 to 15,000 tons of heavy melting steel at \$21.50 to \$22, delivered, and on a large tonnage of mixed borings and turnings for delivery at Bethlehem, Steelton and Sparrows Point paid from \$17.25 to \$17.75, delivered. The Alan Wood Iron & Steel Co. has also bought a tonnage of heavy melting steel at \$22.50, delivered. The latter price now appears to be minimum for first grade material. No. 1 cast continues in good demand, owing to the scarcity and high prices of foundry pig iron, sales of cast having been made at \$32 to \$33, delivered. An Eastern steel plant has bought 2500 tons of machine shop turnings at \$17, delivered, but it was a forced sale brought about as a result of the coal shortage slowing up mill operations and cannot be regarded as correctly representing the present market, which is about \$18.50 to \$19, delivered. We quote for delivery at consumers' works, Eastern Pennsylvania,

No. 1 heavy melting steel.....	\$22.50 to \$23.50
Steel rails rerolling.....	32.00 to 34.00
No. 1 low phosphorus, heavy, 0.04 and under.....	27.00 to 28.00
Car wheels.....	30.00 to 31.00
No. 1 railroad wrought.....	31.00 to 32.00
No. 1 yard wrought.....	25.00 to 26.00
No. 1 forge fire.....	18.50 to 19.00
Bundled skeleton.....	18.50 to 19.00
No. 1 busheling.....	20.00 to 21.00
No. 2 busheling.....	16.50 to 17.50
Turnings (short shoveling grade for blast furnace use).....	17.50 to 18.00
Mixed borings and turnings (for blast furnace use).....	17.25 to 17.75
Machine-shop turnings (for rolling mill and steel works use).....	18.50 to 19.00
Heavy axle turnings (or equivalent).....	20.00 to 21.00
Cast borings (for rolling mills).....	22.00 to 23.00
Cast borings (for chemical plant use).....	24.50 to 25.00
No. 1 cast.....	32.00 to 33.00
Railroad grate bars.....	28.00 to 27.00
Stove plate.....	22.50 to 23.50
Railroad malleable.....	27.00 to 28.00
Wrought iron and soft steel pipes and tubes (new specifications).....	22.00 to 23.00
Ungraded pipe.....	17.00 to 18.00
Iron car axles.....	45.00 to 46.00
Steel car axles (f.a.s. New York for export).....	35.00 to 38.00

Bars.—Steel bars are practically unobtainable at less than 3c., Pittsburgh, for delivery in first quarter, and as high as 3.75c., Pittsburgh, has been obtained by a leading Eastern mill for prompt delivery. Another independent producer has raised its price from 2.50c. to 3c., Pittsburgh, but a Buffalo mill offers bars to its regular customers for second quarter at 2.50c. Bar

iron is in fair demand at the new price, 3.50c., Pittsburgh. We quote steel bars at 3.245c. and bar iron at 3.745c., Philadelphia.

Sheets.—Black and galvanized sheets are practically unobtainable at any price. A local mill is quoting blue annealed sheets on the basis of 4.05c., Pittsburgh, for No. 10 gage.

Chicago

CHICAGO, Dec. 23.

Increasing scarcity of both raw and finished products is the ruling characteristic of the market. Most pig iron producers are out of the market or selling very sparingly. Both rerolling and forging billets are difficult to obtain. Two inquiries for 2000 tons each of the former product were recently turned down by the leading interest because it is booked so far ahead that it cannot entertain new business. The two leading steel makers in this district will not be important factors in plates, shapes or bars for several months to come. The foremost independent is entirely sold out on these products until July 1 and the Illinois Steel Co. has such comfortable tonnages on its books that it does not wish to add to its commitments aside from taking small orders to assist old customers until production is such as to warrant it. The automotive industry is exerting tremendous pressure on mills for its sheet requirements, but apparently with little success. Wire products and bolts and nuts are also difficult to obtain. Cast iron pipe has advanced \$4 a ton. Scrap has taken a new lease of life and has generally advanced from 50c. to \$1.50 a ton.

The foremost independent continues to operate at about 80 per cent of ingot capacity. The leading interest now has nine furnaces in blast at Gary and six at South Chicago and expects to have all its open-hearth furnaces at those plants in operation before the end of the week. The Joliet billet mill is operating again and a second blast furnace will go in there soon. The Milwaukee plant of the Illinois Steel Co. is running full with the exception that one of its two merchant blast furnaces is still inactive.

Ferroalloys.—Ferromanganese 80 per cent has advanced to \$130 delivered.

We quote 80 per cent ferromanganese at \$130 delivered; 50 per cent ferrosilicon at \$85 delivered; spiegeleisen 18 to 22 per cent, \$40 furnace.

Plates.—The foremost interest has its books comfortably filled and for the time being is practically out of the market. The Manhattan Oil Co. has ordered 100 tank cars from the General American Car Co.

The mill quotation is 2.65c. Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers quote 3.67c. for plates out of stock.

Pig Iron.—The holiday season has slightly slackened activity in the market, but the demand for malleable and No. 2 foundry is still strong. Inquiry for malleable during the past week has aggregated 20,000 tons, a part of which has been placed. An Ohio furnace recently sold 200 tons of malleable for prompt shipment at \$39, furnace, subject to a \$3.80 freight to Chicago, and is quoting \$40.25, for first quarter delivery. Valley furnaces are offering malleable for first quarter at \$39 furnace and for second quarter at \$38. The leading producer of Northern foundry is not yet in a position to take much business. A steel interest, however, has offered 10,000 tons of Northern foundry, 1.75 to 2.25 per cent silicon, and is rapidly disposing of it through a local dealer. Limited amounts of Southern iron for prompt delivery continue to be offered at prices ranging from \$35 to \$38 Birmingham and Virginia furnaces. Much of the foundry iron which has been coming into this market from other territories is high silicon material and for that reason No. 2 foundry is now in greater demand than the higher grades. None of the important Southern producers are quoting on first quarter or first half delivery. A Virginia furnace is quoting \$40 furnace or \$44.90 Chicago on first quarter business. There is an inquiry for 1000 tons of copper free low phosphorus before the trade calling for first half ship-

ment. This material, however, is not generally in demand.

The following quotations are for iron delivered at consumer's yards except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnaces and do not include a switching charge averaging 50c. per ton.

Lake Superior charcoal, average silicon 1.50, f.o.b. furnace, average freight to Chicago, \$2.50 (other grades subject to usual differentials)	\$40.00 to \$45.00
Northern coke foundry, No. 2 silicon, 1.75 to 2.25	40.00
Northern high phosphorus foundry	40.00
Southern coke, No. 1 foundry and No. 1 soft, silicon, 2.75 to 3.25	42.70
Southern coke, No. 2 foundry, silicon, 2.25 to 2.75	41.35
Southern foundry, silicon 1.75 to 2.25	40.00
Malleable, not over 2.25 silicon	40.50
Basic	39.00
Low phosphorus (copper free)	41.00
Silvery, 7 per cent.	49.15 to 51.80

Structural Material.—Although material is increasingly difficult to obtain, the fabricating field continues active. In Chicago, however, most fabricators are idle on account of a strike which has been in effect for several weeks. The Worden-Allen Co., Milwaukee, will furnish 2935 tons for extensions to the pipe mills, power plant and foundry of the Steel & Tube Co., Indiana Harbor, Indiana. The Plamondon Mfg. Co., Chicago, has awarded 750 tons for a foundry and machine shop to the Northwestern Bridge & Iron Co. Other smaller awards aggregate nearly 4000 tons. Among pending jobs are the Brandeis Building, Omaha, Neb., 2000 tons; the Humble Oil Co. Building, Houston, Tex., 1600 tons; a bridge for the Alaskan Northern railroad, 1500 tons and the Lake and State theatre, Chicago, 750 tons.

The mill quotation is 2.45c. Pittsburgh, which takes a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote \$3.47 for materials out of warehouse.

Bars.—With the two foremost interests practically out of the market for the first half, mild steel bars are exceedingly difficult to obtain from the mills. A further advance in bar iron is expected as a result of the current rise in scrap. One producer is taking orders with specifications attached for 1920 delivery but is unwilling to close any contracts.

Mill prices are: Mild steel bars, 2.85c. to 3.25c., Pittsburgh, taking a freight rate of 27c. per 100 lb.; common bar iron, 2.87c. to 3c. Chicago; rail carbon, 3c. mill. Jobbers quote 3.37c. for steel bars out of warehouse.

Bolts and Nuts.—The demand continues for in excess of the supply with no immediate prospect of any improvement in the situation.

Jobbers quote: Structural rivets, 4.72c.; boiler rivets, 4.82c.; machine bolts up to $\frac{3}{8}$ x 4 in., 35 and 5 per cent off; larger sizes, 25 and 5 off; carriage bolts up to $\frac{3}{8}$ x 6 in., 30 off; larger sizes, 20 off; hot pressed nuts, square tapped and hexagon tapped, \$1.45 off; coach or lag screws, gimlet points, square heads, 40 and 5 per cent off. Quantity extras are unchanged.

Sheets.—The demand for sheets is exceedingly heavy with most mills sold so far ahead that they are unwilling to take new business. Automobile manufacturers are unable to secure anywhere near their needs and as a result they have been forced to curtail operation materially. The output of the most prominent Detroit builder is said to have been reduced to 50 per cent of normal. One local seller recently turned down a 9000 ton order for blue annealed sheets despite the fact that the consumer was willing to accept any delivery the producer would specify.

Mill quotations are 4.35c. for No. 28 black, 3.55c. for No. 10 blue annealed, and 5.70c. for No. 28 galvanized.

Jobbers quote Chicago delivery out of stock: No. 10 blue annealed, 4.57c.; No. 28 black, 5.62c., and No. 28 galvanized, 6.97c.

Rails and Track Supplies.—The demand for light rails continues heavy both from domestic and foreign sources. Within the past six weeks the leading interest has booked over 15,000 tons, mostly 12-lb. rails, for shipment to Japan. A shortage of ocean ship tonnage is impeding the closing of further orders for export.

Standard railroad spikes, 3.35c. Pittsburgh. Track bolts with square nuts, 4.35c. Pittsburgh. Steel tie plates and iron angle bars, 2.75c. Pittsburgh and Chicago; tie plates, iron, 2.90c. f.o.b. makers' mills. Light rails, 2.45c. f.o.b. makers' mills, with usual extras.

Wire Products.—Few producers are willing to take

new business and this is particularly true of the leading interest, which does not wish to burden itself with further commitments until mill operation gets back into full swing. For mill prices see finished iron and steel Pittsburgh, page 1357.

Cast Iron Pipe.—Prices have advanced \$4 a ton, making the present quotation on 4-in. water pipe \$69.80, Chicago. Pipe foundries have well filled order books for this time of the year when they are usually engaged in adding to their stocks.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$69.80; 6-in. and above, \$66.80; class A and gas pipe, \$2 extra.

Old Material.—Scrap has fully recovered from the effects of the coal strike and is exceedingly active. Not only are consumers taking an interest in the market but dealers are accumulating all the material they can in anticipation of further advances. Shipments are being retarded, however, by the restrictions of open cars to the movement of coal. Material advertised by the railroads includes 2500 tons offered by the Rock Island, 600 tons by the Chicago & Western Indiana and 500 tons by the Grand Trunk, the latter amount being exclusively No. 1 rerolling rails.

We quote delivery in buyer's yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Iron rails	\$28.00 to \$29.00
Relaying rails	40.00 to 50.00
Car wheels	31.00 to 32.00
Steel rails, rerolling	31.50 to 32.50
Steel rails, less than 3 ft.	26.00 to 26.50
Heavy melting steel	22.00 to 23.00
Frogs, switches and guards, cut apart ..	22.00 to 23.00
Shoveling steel	21.50 to 22.00

Per Net Ton	
Iron angles and splice bars	\$27.50 to \$28.50
Steel angle bars	22.00 to 22.50
Iron arch bars and transoms	29.25 to 30.25
Iron car axles	34.00 to 35.00
Steel car axles	30.00 to 30.50
No. 1 busheling	19.50 to 20.00
No. 2 busheling	13.50 to 14.00
Cut forge	21.50 to 22.00
Pipes and flues	17.50 to 18.00
No. 1 railroad wrought	24.00 to 25.00
No. 2 railroad wrought	21.50 to 22.00
Steel knuckles and couplers	22.50 to 23.00
Coil springs	23.50 to 24.00
No. 1 cast	33.50 to 34.00
Roller punchings	24.50 to 25.00
Locomotive tires, smooth	21.50 to 22.00
Machine-shop turnings	10.50 to 11.00
Cast borings	12.50 to 13.50
Stove plate	27.00 to 28.00
Grate bars	26.75 to 27.75
Brake shoes	22.00 to 23.00
Railroad malleable	25.00 to 26.00
Agricultural malleable	26.00 to 27.00
Country mixed	17.50 to 18.50

British Prices Still Advancing

Tin Plates Soaring—Pig Iron and Ferromanganese Higher—Export Demand for Bar Iron

(By Cable)

LONDON, ENGLAND, Dec. 22.

The steel market is very firm and the tendency of prices is higher, with traffic congestion and confusion growing. The tin-plate market is rampant, 55s. having been paid for early delivery, with 49s. obtained for April-June shipment. Inquiries are very large. America is inquiring for black sheets for January-March delivery, but it impossible to obtain them. Galvanized sheets, No. 24 gage, are strong with £43 paid for March delivery and £45 asked. Enameling black plates are unprocurable and are nominally quoted at £50 to £51 for circles, with £38 to £39 asked for rectangles. Finished black plates are quoted at £42 to £43, with leading makers fully booked into September.

In pig iron a small business has been done and makers are reluctant to quote owing to uncertainty as to prices. Foundry grades are very scarce and it is expected that the advance in railroad rates will add 5s. 3d. to Cleveland prices.

The ferromanganese market is strong because of the tight ore position and prices have been advanced to £28 10s.

Bar iron is quoted at £23 to £23 10s. and there is a

large unsatisfied export demand, including 50,000 tons for Holland. Steel bars are quoted at £21 15s. to £22 15s., with ship plates at £22 to £23. Boiler plates are quoted at £25 to £28.

We quote per gross ton, except when otherwise stated, f.o.b. makers' works, with American equivalents figured at \$3.84 for £1 as follows:

	£	s.	d.	£	s.	d.	
Ship plates	22	0	0	23	0	0	\$84.48 to \$88.32
Boiler plates	25	0	0	28	0	0	96.00 to 107.52
Tees	18	15	0	19	15	0	72.00 to 75.84
Channels	18	0	0	19	0	0	69.12 to 72.96
Beams	18	15	0	19	5	0	72.00 to 73.92
Round bars, 3/4 to 3 in. 21	15	0	0	22	15	0	83.52 to 87.36
Rails, 60-lb. and up. 17	10	0	0	17	15	0	67.20 to 68.16
Billets and sheet bars 16	7	6	0	16	10	0	62.86 to 63.36
Steel hoops	25	15	0	26	0	0	98.88 to 99.84
Tin plates	0	49	0				9.40
Galv. sheets, 24 g. 42	0	0	0	45	0	0	165.12 to 172.80

Shipping Terms Defined at Convention

The convention of delegates from trade organizations and the Bureau of Foreign and Domestic Commerce, called by the National Foreign Trade Council for Dec. 16, at the India House, New York, formulated definitions of the principal abbreviations in foreign and domestic trade usage. In defining f. o. b. car, mill, works or factory it was decided to limit as far as possible the number of terms, using instead, the name of the city, in order to avoid confusion. The abbreviation c. i. f., it was agreed, holds the seller responsible for goods until delivered alongside the ship and an ocean bill of lading and insurance policy are delivered to the purchaser or his agent.

The National Foreign Trade Council is preparing a booklet for distribution to Chambers of Commerce and other trade organizations, which will give the complete definitions decided upon as standard and agreed to by the representatives of the Bureau of Foreign and Domestic Commerce. Among those represented were: The United States Chamber of Commerce; the Merchants Association of New York; the Philadelphia Commercial Museum; the American Manufacturers Export Association; the Chamber of Commerce of the State of New York; the National Association of Manufacturers; the American Exporters' and Importers' Association and the New York Produce Exchange.

Annual Sales Convention of Midwest Engine Co.

The Midwest Engine Co., Indianapolis, held its annual sales convention in that city and Anderson, Ind., Dec. 2 to 6. More than 30 district representatives were present. N. McCarty, manager and engineer of the Diesel engine division, explained construction details and production methods. At Anderson where the Hill pump division of the company is located, V. Shleyer, engineer in charge of the centrifugal pump department, lectured on the design and efficiencies of the Midwest-Hill centrifugal pumps. A test on a 10-stage tandem turbine-driven mine pump to operate against a 1400-ft. head, 606 lb., was witnessed. H. H. Wait, designer of the Midwest Wait impulse-type steam turbine talked on the design and construction of the various units and tests of several sizes were witnessed.

Booklet on High Speed Steel

High speed steel, its manufacture and heat treatment, is discussed in a booklet issued by the Onondaga Steel Co., Syracuse, N. Y. This company, founded in 1915, specializes in the manufacture of high-speed tool steel marketed under the brand "ON." The book gives useful information on quenching oils, and directions for heat-treatment which include temperatures and color charts. Under the heading of tool conservation is explained the company's plan for the reclamation of high-speed steel scrap which is secured from the user of this product, converted into bars and tool bits and then returned. The selection of high-speed steel scrap using the emery wheel spark method is explained and valuable tables such as sizes and weights of high-speed steel bars giving millimeters and kilograms in red and inches and pounds in black are included.

IRON AND INDUSTRIAL STOCKS

Prices Rule Higher With the Passing of Coal Regulations

NEW YORK, Dec. 22.

Prices for iron and industrial stocks are considerably higher than they were a week ago, due to a combination of developments having a direct bearing on our industrial life. The removal of the fuel regulations, leaving industries free to endeavor to catch up with production, has been one of the leading market factors. Higher prices for products quoted by some of the independent steel mills have materially improved sentiment in financial circles. The market price for United States Steel, for instance, is higher than it has been before in more than a month.

Republic Iron & Steel, however, has been the leading feature of the steel group, largely due to its technical position marketwise, although the partial resumption of its mills following a long period of inactivity has been a factor. Crucible Steel has continued to fluctuate widely, mostly on the up side, due in a measure to favorable earnings talk. The recent optimistic statements by C. M. Schwab partly account for the improvement in prices for Bethlehem B.

Baldwin Locomotive and American Locomotive have been helped by the volume of foreign business being booked by these corporations. General Motors is materially higher than it was a week ago, but the other automobile stocks have not changed a great deal, possibly because operations by the companies have been more or less restricted of late.

Generally speaking, the inclination of the foreign exchange market to advance has helped stock market sentiment and quotations for many industrial issues not already mentioned. A marked improvement in the foreign demand for the metal and higher prices for it are largely responsible for the better undertone of the market for copper stocks.

The range of prices on active iron and industrial stocks from Tuesday of last week to Tuesday of this week was as follows:

Allis-Chalm. com. 43 1/2 - 47	Lackaw. Steel... 84 1/2 - 87 1/2
Allis-Chalm. pf. — - 94	Lake Sup. Corp... 20 1/2 - 21
Am. Can com... 53 1/2 - 55 1/2	Midvale Steel... 48 1/2 - 49 1/2
Am. Can pf... 98 1/2 - 99 1/2	Nat.-Acme 36 1/2 - 37
Am. Cr. & F. cm. 136 1/2 - 139 1/2	Nat. E. & St. cm. 85 1/2 - 86 1/2
Am. Cr. & F. pf. 113 1/2 - 114 1/2	Nat. E. & St. pf. — - 101 1/2
Am. Loco. com... 93 1/2 - 97 1/2	N. Y. Air Brake. 108 1/2 - 111 1/2
Am. Loco. pf... 103 1/2 - 104	Nova Scotia Stl. 71 1/2 - 73
Am. Ship com... 115 - 124	Pittsb. Steel pf. — - 92
Am. Stl. Fdr. cm. 44 1/2 - 45 1/2	Pressed Stl. com. 98 1/2 - 101 1/2
Am. Stl. Fdr. pf. 91 1/2 - 92	Pressed Steel pf. — - 101
Bald. Loco. com. 107 1/2 - 111 1/2	Ry. Stl. Spg. cm. 95 1/2 - 96 1/2
Beth. Stl. com... 89 1/2 - 91 1/2	Replogle Steel... 49 - 50
Beth. Stl. Cl. B. 93 1/2 - 96	Republic com... 109 1/2 - 115 1/2
Beth. Steel, 8 per cent, pf. 110 1/2 - 112	Republic pf. 105 - 106 1/2
Case, J. I. pf... 97 - 99	Sloss com. 70 1/2 - 73 1/2
Chic. Pneu. Tool. — - 103 1/2	Superior Steel... 43 1/2 - 47 1/2
Colo. Fuel..... 39 - 41 1/2	Transue-Williams 62 1/2 - 62 1/2
Cru. Steel com... 209 - 218	U. S. Alloy Steel. 50 - 51
Cru. Steel pf... — - 100	U. S. Pipe com... 21 - 22 1/2
Gen. Electric ... 165 1/2 - 169 1/2	U. S. Pipe pf... — - 53
Gt. No. Ore. Cert. 37 - 39 1/2	U. S. Steel com. 102 1/2 - 105 1/2
Gulf States Stl... 64 - 70 1/2	U. S. Steel pf... 112 1/2 - 118 1/2
Int. Har. com... 131 - 134 1/2	Van. Steel..... 57 - 59 1/2
Int. Har. pf... 112 - 114	Vn. I. C. & Coke 76 - 81
	Westingh. Elec... 52 1/2 - 53 1/2

Dividends

The American Shipbuilding Co., quarterly 1% per cent and extra 2 1/2 per cent on the common, and 1% per cent on the preferred, all payable Feb. 3.

The Brier Hill Steel Co., quarterly, 2 1/2 per cent on the common and 1% per cent on the preferred, payable Jan. 1.

The Canadian Locomotive Co., quarterly, 1% per cent on the common and preferred stocks, payable Jan. 1.

The Canadian Westinghouse Ltd., quarterly 1% per cent and extra 1 per cent, payable Jan. 1.

The Nova Scotia Steel & Coal Co., quarterly 1 1/2 per cent on the common, and 2 per cent on the preferred, payable Jan. 15.

The Steel & Tube Co. of America, quarterly, 1% per cent on the preferred, payable Jan. 1.

The Virginia Iron, Coal & Coke Co., 3 per cent, payable Jan. 25.

The Trumbull Steel Co., quarterly, 1 1/2 per cent and extra 1 per cent on the common, and 1% per cent on the preferred, payable Jan. 1.

The Truscon Steel Co., quarterly, 4 per cent on the common, payable Jan. 15.

Industrial Finances

The stockholders of the Bethlehem Motors Corporation have ratified the plan to increase the capital from 130,000 to 200,000 shares of no par value.

The \$6,000,000 Hydraulic Steel Co. 7 per cent preferred stock offered for public subscription is convertible into common stock at \$45 per share before April 1, 1920, and at \$50 per share after April 1, 1921.

On January 6, next, the stockholders of Landers, Frary & Clark, New Britain, Conn., manufacturers of hardware and cutlery, will be asked to approve an increase in the capitalization from \$5,000,000 to \$6,000,000 or from 200,000 to 240,000 shares, par \$25. The corporation has no funded debt.

Action on the semi-annual preferred dividend of the Charcoal Iron Co. of America, due in January, has been postponed "to maintain the company's financial position against the uncertainties of the future." The company is well booked into 1920 on pig iron business.

A suit has been filed in the United States District Court at Philadelphia by the Midvale Steel Co. to recover \$275,142 the company was compelled to pay to the Government in taxes on its net profit from the manufacture of rough shell and gun forgings in 1916. This sum is in addition to the \$119,638 voluntarily paid the Government from profits on completed war munitions.

The annual report of the Pittsburgh Steel Co., Pittsburgh for the year ending June 30, 1919 shows cash on hand \$1,447,077.60 and a total of \$3,642,560.80 in Liberty Loan Bonds and other Government securities. The inventory of raw materials and supplies shows a value of \$4,746,981.43. The net sales for the past year were \$31,265,012.37 as against \$37,930,842.32 for the previous year. The net profit for the year after deducting for depreciation of plants, extinguishment of mines and estimated income, and war profits taxes, was \$2,771,546.75 as compared with \$4,556,442.82 for the previous year.

The annual report of the Carbon Steel Co. for the year ending Oct. 1, 1919, shows net profits for the year, after deducting an allowance of \$3,225,000 for federal income and excess profit taxes, of \$1,698,345.63.

The income account of the Lackawanna Steel Co., Lackawanna, N. Y. and subsidiary companies for the nine months ending Oct. 7, 1919 shows a net profit of \$1,317,350.25, a decrease of \$8,521,752.63 compared with the year previous. The total net earnings for all properties was \$3,629,422.80, from which was deducted for interest, bonds and other obligations of the Lackawanna Steel Co. and subsidiary companies \$809,940.28 and for extinguishment of mines, mining investments, depreciation and accruing renewals \$1,502,132.27. Gross tons of unfilled orders for the nine months is 178,981, compared with 451,405 for the previous year.

On Jan. 1, next, the Chicago Pneumatic Tool Co. will redeem at 105 and interest its 20-year, 5 per cent sinking fund gold bonds, dated Dec. 31, 1901.

The Smalley General Co., Inc., Bay City, Mich., machinery builders, has increased its capital stock from \$50,000 to \$525,000, paid up. The company has no bonded, mortgaged or other funded indebtedness. The new stockholders are: John W. Eddy, Skinner-Eddy Corporation, Seattle, Wash.; James G. Eddy, Ferry-Baker Lumber Co., Everett, Wash.; R. B. Eddy of the Eddy Investment Co., Bay City, Mich., and J. R. Decker, sales manager of the company.

The Presteel Mfg. Co., Bridgeport, has reorganized and changed its name to the Prestoy Mfg. Co.

Hammond & Irving, Inc., has leased the plant of the Bridgeport Steel Co., for six months with option to purchase at the termination of the lease. The plant will specialize in weldless steel rings for ball bearing races and will also make die blocks, forgings and shapes. Mr. Hammond is the founder of the Hammond Steel Co., Syracuse, N. Y., and R. M. Irving is of Barnes & Irving, Inc., Syracuse, mill supplies, tools and machinery.

American Engineering Standards Committee

Supplementing the information given last week of the reorganization of the American Engineering Standards Committee, with A. A. Stevenson at its head, may be outlined the enlarged scope of the organization as explained by Prof. Comfort A. Adams, former chairman of the committee, who is now identified with the National Research Council. Professor Adams, at an industrial safety conference held at the Bureau of Standards, Washington, Dec. 8, said that membership in the standards committee is now open to such organizations or groups of organizations of national scope as may be approved; there shall be no more than three members from each such organization, and the annual dues are \$500 for each representative. If an application for membership is approved by three-fourths of the committee it is submitted to the organizations having membership on the committee, and unless disapproved by more than one-fourth of these within 90 days it is considered to be ratified. Dr. P. G. Agnew, in the Bureau of Standards, will be permanent secretary, with headquarters at present at least at the Engineering Societies Building, 29 West Thirty-ninth Street, New York.

Committees to formulate standards will be organized by suitable engineering societies, Government bureaus or other bodies which shall be designated as sponsors and shall be responsible for the carrying out of the work. Such a committee must include representatives of all interests concerned in the formulation of a standard, and upon completion of its work and substantial agreement upon the same, shall report to the sponsor body. If the latter adopts the standard it is forwarded to the American Engineering Standards Committee for approval, and when so approved shall be designated as either recommended practice, tentative standard or American standard. The standards committee will not itself pass judgment upon the details of the proposed standards but rather upon the composition of the committee which has formulated the standard or approved it.

A number of other organizations have already applied to the American Engineering Standards Committee for membership. These include the National Safety Council, American Mining Congress, insurance, utility and technical associations. To become a member an organization must be national in its scope.

Joint Committee on Safety Codes

The American Engineering Standards Committee was asked by the industrial safety conference to request the International Association of Industrial Accident Boards and Commissions, the Bureau of Standards and the National Safety Council to organize a joint committee on safety codes, that this joint committee report not later than Feb. 1, 1920, to the American Engineering Standards Committee.

In the discussion on this subject it was pointed out that the American Engineering Standards Committee was not primarily interested in safety matters, and that the committee contemplated might well serve as a steering committee on safety code work. The opinion was freely expressed that such a committee should be a permanent one, that it should contain representatives of all interests involved in safety codes and that it might well be called a National Safety Code Conference and hold annual meetings. Such a committee would be in position to co-ordinate work on safety codes, to arrange for necessary interpretations, to initiate new codes as they become necessary, and to form a central agency to insure co-operation.

New Electric Steel Company

The Waterhouse Steel Co., Lockport, N. Y., capitalized at \$350,000, has been organized to manufacture steel by the electrical process. It is headed by Dr. George B. Waterhouse, chief metallurgist of the Lackawanna Steel Co., Buffalo, and Vere R. Decrow of Buffalo. A manufacturing site has been secured by the purchase of the former Holly Mfg. Co. property along the Erie Canal, Lockport, with water power rights of 3500 hp. A plant will be erected at once.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

(Prices quoted below represent as closely as they can be given those charged by mills to their regular trade for indefinite shipment. Owing to practical famine in supply of finished steel products and the heavy demand existing, tenders of new business are being made to the mills by jobbers and consumers at higher prices than those quoted below, but as a rule the mills are turning this offered business away.)

Freight rates from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, with revisions effective Nov. 1, 1918, in carloads, to points named, per 100 lb. are as follows: New York, 27c.; Philadelphia, 24.5c.; Boston, 30c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49.5c.; Denver, 99c.; Omaha, 59c.; minimum carload, 80,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, \$1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.315, minimum carload, 40,000 lb.; and \$1.25, minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. Jacksonville, Fla., all rail, car lots, 41.5c.; less, 59c.; rail and water, car lots, 34.5c.; less, 46.5c. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, 1/4 in. thick and over, and zees, structural sizes, 2.45c.

Wire Products

Wire nails, \$3.25 to \$4.50 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$1.50, and shorter than 1 in., \$2.00. Bright basic wire, \$3.10 to \$3.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.10 to \$3.25; galvanized wire, \$3.95; galvanized barbed wire and fence staples, \$4.25 to \$4.45; painted barbed wire, \$3.75; polished fence staples, \$4.50; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 60 per cent off list for carload lots, 59 per cent for 1000-rod lots, and 58 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets, \$4.10 base
Large boiler rivets, \$4.20 base
Small rivets, 1/4 in., 5/16 in. and 7/16 in. diameter, 50 per cent off list
Machine bolts hp. nuts, 1/2 in. x 4 in.:
Smaller and shorter, rolled threads, 50 and 10 per cent off list
Cut threads, 50 per cent off list
Larger and longer sizes, 40 and 5 per cent off list
Machine bolts, c.p.c. and t. nuts, 1/2 in. x 4 in.:
Smaller and shorter, 40 and 5 per cent off list
Larger and longer, 35 and 5 per cent off list
Carriage bolts, 1/2 in. x 6 in.:
Smaller and shorter, rolled threads, 45 and 5 per cent off list
Cut threads, 40 and 5 per cent off list
Larger and longer sizes, 30 and 10 per cent off list
Lag bolts, 50 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3, 50 per cent off list
Plow bolts, Nos. 4 to 10, 50 plus 20 per cent off list
Hot pressed nuts, sq. blank, 2.50c. per lb. off list
Hot pressed nuts, hex. blank, 2.50c. per lb. off list
Hot pressed nuts, sq. tapped, 2.25c. per lb. off list
Hot pressed nuts, hex. tapped, 2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank, 2.50c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped, 2.25c. per lb. off list
Semi-finished hex. nuts:
1/2 in. and larger, 65 per cent off list
9/16 in. and smaller, 70 and 10 per cent off list
Stove bolts in packages, 75-10-21/2 per cent off list
Stove bolts in bulk, 75-10-21/2 per cent off list
Tire bolts, 60-10 per cent off list
The above discounts are from Nov. 1, 1919.
All prices carry standard extras, Pittsburgh basis.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$52 to \$65; chain rods, \$65 to \$70; screw rivet and bolt rods and other rods of that character, \$65 to \$70. Prices on high carbon rods are irregular. They range from \$75 to \$100, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 1/2 in., 9/16 in. and larger, \$3.35 per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, 3/4 in., 7/16 in. and smaller, \$3.85 to \$4 per 100 lb. in lots of 200 kegs of 200 lb. each or more; track bolts, \$4.35 to \$4.50 per 100 lb. in carload lots of 200 kegs or more, with the usual extras for small lots. Boat and barge spikes, \$3.85 to \$4 per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., \$13.80 per package; 8-lb. coating, 1 C., \$14.10; 12-lb. coating, 1 C., \$15.80; 15-lb. coating, 1 C., \$16.50; 20-lb. coating, 1 C., \$18.05; 25-lb. coating, 1 C., \$19.30; 30-lb. coating, 1 C., \$20.30; 35-lb. coating, 1 C., \$21.30; 40-lb. coating, 1 C., \$22.30 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.35c. to 2.75c. from mill. Bar iron, 3.25c.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld			
Steel		Iron	
Inches	Black Galv.	Inches	Black Galv.
1/4, 1/2 and 3/4	50 1/2 24	1/4 and 1/2	29 1/2 2 1/2
1/2 to 3	51 1/2 40	1/2 to 3	30 1/2 3 1/2
	57 1/2 44	3/4 to 1 1/2	34 1/2 16 1/2
			30 23 1/2
Lap Weld			
2	50 1/2 38	1 1/4	24 1/2 9 1/2
2 1/2 to 6	53 1/2 41	1 1/2	31 1/2 17 1/2
7 to 12	50 1/2 37	2	32 1/2 18 1/2
13 and 14	41	2 1/2 to 6	34 1/2 21 1/2
15	38 1/2	7 to 12 1/4	31 1/2 18 1/2
Butt Weld, extra strong, plain ends			
1/4, 1/2 and 3/4	46 1/2 29	1/4, 1/2 and 3/4	28 1/2 11 1/2
1/2 to 3	51 1/2 39	1/2 to 3	33 1/2 20 1/2
	55 1/2 43	3/4 to 1 1/2	39 1/2 24 1/2
2 to 3	56 1/2 44		
Lap Weld, extra strong plain ends			
2	48 1/2 37	1 1/4	25 1/2 10 1/2
2 1/2 to 4	51 1/2 40	1 1/2	31 1/2 17 1/2
4 1/2 to 6	50 1/2 39	2	33 1/2 20 1/2
7 to 8	46 1/2 33	2 1/2 to 4	35 23 1/2
9 to 12	41 1/2 28	4 1/2 to 6	34 1/2 22 1/2
		7 to 8	26 1/2 14
		9 to 12	21 1/2 9 1/2

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers have been seven (7) points lower (higher price) than carload lots and on butt and lap weld galvanized iron pipe have been nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh:

Lap Welded Steel	Charcoal Iron
3 1/2 to 4 1/2 in. 40 1/2	3 1/2 to 4 1/2 in. —16
2 1/2 to 3 1/2 in. 30 1/2	3 to 3 1/2 in. —1 1/2
2 1/2 in. 24	2 1/2 to 2 3/4 in. +1
1 1/2 to 2 in. 19 1/2	2 to 2 1/2 in. +10
	1 1/2 to 1 3/4 in. +20

Standard Commercial Seamless—Cold Drawn or Hot Rolled

Per Net Ton	Per Net Ton
1 in. \$327	1 1/2 in. \$207
1 1/4 in. 267	2 to 2 1/2 in. 177
1 3/4 in. 257	2 1/2 to 3 in. 167
1 1/2 in. 207	4 in. 187
	4 1/2 to 5 in. 207

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiations.

Sheets

Makers' prices for mill shipments on sheets of United States standard gage in carload and larger lots are as follows:

Blue Annealed—Bessemer	
	Cents per lb.
No. 8 and heavier	3.50
Nos. 9 and 10 (base)	3.55
Nos. 11 and 12	3.60
Nos. 13 and 14	3.65
Nos. 15 and 16	3.75
Box Annealed, One Pass Cold Rolled—Bessemer	
Nos. 17 to 21	4.15
Nos. 22 to 24	4.20
Nos. 25 and 26	4.25
No. 27	4.30
No. 28 (base)	4.35
No. 29	4.45
No. 30	4.55
Galvanized, Black Sheet Gage—Bessemer	
Nos. 10 and 11	4.70
Nos. 12 to 14	4.80
Nos. 15 and 16	4.95
Nos. 17 to 21	5.10
Nos. 22 to 24	5.25
Nos. 25 and 26	5.40
No. 27	5.55
No. 28 (base)	5.70
No. 29	5.95
No. 30	6.20
Tin-Mill Black Plate Bessemer	
Nos. 15 and 16	4.15
Nos. 17 to 21	4.20
Nos. 22 to 24	4.25
Nos. 25 to 27	4.30
No. 28 (base)	4.35
No. 29	4.40
No. 30	4.40
Nos. 30 1/2 and 31	4.45

Non-Ferrous Metals

Cents Per Pound for Early Delivery

Dec.	Copper, New York		Tin, New York	Lead		Spelter	
	Lake	Electro- lytic		New York	St. Louis	New York	St. Louis
17	19.25	18.75	54.00	7.20	6.95	8.50	8.15
18	19.25	18.75	54.00	7.25	7.00	8.55	8.20
19	19.25	18.75	54.00	7.25	7.00	8.55	8.20
20	19.00	18.75	.....	7.30	7.05	8.55	8.20
22	19.00	18.75	55.50	7.35	7.10	8.55	8.20

NEW YORK, Dec. 22.

The markets are generally dull and prices are firm. Exchange values continue to be a prominent factor. Copper is unchanged in an inactive market. Tin is higher, due to higher exchange values and advancing quotations in London. The lead market is the strongest of all and prices are still ascending. Demand for zinc has fallen off and prices are slightly easier. Antimony is unchanged.

New York

Copper.—Electrolytic copper for December and January delivery is in light demand owing to the approaching holidays. Buying has been fairly heavy in the last four weeks both for domestic and foreign account. Prices are steady at 18.75c. to 19c. for electrolytic for early delivery, with Lake at 19c. to 19.25c. for the same position.

Tin.—The tin market has been quiet and less metal has been sold than there was a week ago. Sterling exchange values continue to be the biggest factor in the changes in prices from day to day. The London tin market also is a factor, values jumping there by leaps and bounds almost daily. Corresponding, however, to British prices, quotations on this side are not as high in proportion. Due to a much higher London market to-day and a firmer tendency in exchange values, spot Straits tin is quoted at 55.50c., New York, an advance of 2c. per pound over a week ago. In London to-day spot Straits was selling at £325 5s. per ton, equivalent to about 55c. per pound with exchange at \$3.80. Tin arrivals thus far this month have been 4008 tons, of which 2818 tons has come in at Atlantic ports. The quantity afloat is still high at 3975 tons.

Lead.—The lead market is exceedingly strong. A good demand with a widespread scarcity of the metal as well as higher prices abroad are the principal factors. On Dec. 18 the American Smelting & Refining Co. advanced its price again from 7c. to 7.15c., New York, or 6.75c. to 6.90c., St. Louis. The outside market continues to keep ahead of the leading interest and to-day lead is quoted and sold at 7.35c., New York, or 7.10c., St. Louis. It is stated that production is beginning to be larger and it is believed that by spring there will be more abundant supplies and possibly lower prices, although the market may go considerably higher between now and then.

Zinc.—There has been a slackening in foreign demand and there has been no increase in domestic buying, but the market remains fairly firm and quotations have eased but slightly. Prime Western for early delivery to-day is quoted at about 8.20c. to 8.30c., St. Louis, or 8.55c. to 8.65c., New York. Producers are generally comfortably sold up for some little time to come. Fluctuations in sterling exchange have checked foreign buying, but the London market is higher at £53 5s. per ton for spot delivery, equivalent to about 9c. per pound with exchange at \$3.80 per pound sterling.

Antimony.—Wholesale lots for early delivery are unchanged at 9.62½c., New York, duty paid.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 32c. to 33c., New York, for early delivery in wholesale lots.

Old Metals.—The market is firm. Dealers' selling prices are reported as follows:

	Cents per lb.
Copper, heavy and crucible.....	19.00
Copper, heavy and wire.....	18.00
Copper, light and bottoms.....	16.00
Brass heavy.....	13.00
Brass light.....	9.00
Heavy machine composition.....	18.00
No. 1 yellow rod brass turnings.....	11.00
No. 1 red brass or composition turnings.....	15.00
Lead, heavy.....	6.50
Lead, tea.....	4.50
Zinc.....	5.50

St. Louis

ST. LOUIS, Dec. 22.—The non-ferrous markets have been firmer with lead in carload lots selling at 7c. bid with some holders asking 7.15c. Zinc in carload lots has been selling at 8.25c. In less than carload lots quotations are: Lead, 7.25c.; spelter, 8.75c.; tin, 60c.; copper, 20.5c.; antimony, 11.5c. In the Joplin ore district prices have been decidedly firmer, as a result of conditions in the metal markets, and zinc blende was moved up \$2.50 per ton, on the top grade. Calamine was firm at slightly better prices with lead ore also strong, at \$88 to \$90 per ton, basis 80 per cent. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c.; heavy red brass, 15c.; light copper, 13c.; heavy yellow brass, 10c.; heavy copper and copper wire, 16c.; zinc, 4c.; lead, 4.50c.; pewter, 35c.; tin foil, 43c.; tea lead, 3c.; aluminum, 22c.

A New Non-Ferrous Alloy

A new alloy containing aluminum, magnesium and vanadium is covered by a patent (U. S. 1,305,166—May 27, 1919) granted to William J. Reardon, Pittsburgh and assigned to the Westinghouse Electric & Mfg. Co. It is claimed as suitable for casting without the formation of blow holes and black specks and to have a tensile strength of 28,000 lb. per sq. in. The alloy may be compounded in various proportions. According to one method, the inventor first prepares an alloy of aluminum and vanadium containing 20 per cent vanadium and 80 per cent aluminum, then an alloy of 92 to 93 per cent aluminum and 7 to 8 per cent of magnesium. One-fourth of one per cent of aluminum vanadium alloy is added to 99.75 per cent of the aluminum-magnesium alloy, resulting in a final alloy containing only 0.05 per cent of vanadium.

Carborundum Refractory Cements

Cements composed principally of carborundum for high temperature furnaces are being manufactured by the Carborundum Co., Niagara Falls, N. Y. The principal uses specified for these cements are as follows: For laying-up firebrick, for patching broken brick or brickwork, tile, muffles, retorts, saggers, etc., patching holes or defects in furnace linings and arches, for making rammed-up furnace linings and hearths, linings for combustion chambers, ladles, etc. They are also made to be used as protective coatings or washes for furnace or kiln lining and for coating electrodes.

The cements are said to be particularly adapted for construction and repair work in oil and gas burning forge, heat treating and annealing furnaces, for plate and angle heating furnaces, non-ferrous metal melting furnaces, crucible furnaces of all kinds, open hearth steel furnaces above the metal and slag lines, pottery kilns, rotary kilns, and boiler furnaces.

It is explained that the mortar used for laying up bricks usually burns out first, thereby exposing the edges of the brick to the flame action, which causes them to burn out. The manufacturer states that these carborundum refractory cements will prevent this, as after they have once been fused they will produce a joint which is more refractory than ordinary firebrick.

The name of the Cleveland Osborn Mfg. Co., maker of molding machines, Cleveland, has been changed to the Osborn Mfg. Co.

PERSONAL

Directors of the Brier Hill Steel Co., Youngstown, Ohio, on Dec. 19, accepted the resignation of William A. Thomas as president, effective Jan. 27 and of A. E. Adams, president of the First National Bank, Youngstown, as a member of the board. James H. Grose was named a director to succeed Mr. Adams. The directors also announced the intention to elect Mr. Grose as president. This statement was issued:

"At a meeting of the directors of the Brier Hill Steel Co., the request of W. A. Thomas to be relieved of the duties of the president at the next annual meeting of



W. A. THOMAS



JAMES H. GROSE

stockholders was considered and it was the sense of the board that such request should be granted. A. E. Adams tendered his resignation as director of the company, which resignation was accepted and such vacancy was filled by the election of James H. Grose. While the election of Mr. Thomas' successor as president cannot take place until a vacancy exists, the board announces that it is the intention to elect James H. Grose as president of the Brier Hill Steel Co. to succeed Mr. Thomas. Mr. Grose is now general superintendent of the Youngstown district of the Carnegie Steel Co., having jurisdiction of the Ohio works, Upper and Lower mills, the McDonald works, the Niles furnace and Greenville works."

Mr. Grose has been district superintendent of the Carnegie Steel Co. at Youngstown since Jan. 1, 1916, when he was appointed to succeed Thomas McDonald, who became consulting manager. Since January, 1912, Mr. Grose had been assistant district superintendent, going to Youngstown from Pittsburgh, where he served as superintendent of the Howard Axle Works at Homestead, Pa., and the Schoen and Slick Wheel Works, both subsidiaries of the Carnegie Steel Co. He is a practical man who has worked his way from the bottom. Mr. Grose started many years ago in the blacksmith department of the Youngstown Car Works.

Among those mentioned to succeed Mr. Grose with the Carnegie company are I. Lamont Hughes, now president of the Lorain Steel Co., with headquarters at Johnstown, Pa.; Louis N. McDonald, assistant district superintendent and in direct charge of the Ohio Works and A. W. Griffith, superintendent of the Upper and Lower Union Mills.

Frank O. Wells, president Greenfield Tap & Die Corporation and one of the prominent figures in the screw thread industry in the United States, has sold his entire holdings to Frederick H. Payne, vice-president. Mr. Wells retires as president and member of the board of directors and Mr. Payne has been elected president in his place. F. G. Echols, vice-president and general manager, has been elected a director of the

corporation to fill the vacancy caused by the resignation of Mr. Wells, but Mr. Wells will remain with the corporation in an advisory capacity.

Roy Brakeman, who has been chief engineer of the Fairfield Works of the American Steel & Wire Co., Fairfield, Ala., has been appointed chief engineer of the Otis Steel Co., Cleveland, and will assume his new duties Jan. 1.

William S. Richardson, United Shoe Machinery Co., is on his way to Mexico, where he will supervise the setting up of a number of plants. Later he will visit Central and South America in the same capacity.

Lloyd Booth, president Falcon Steel Co., Niles, Ohio, announces the appointment of George E. Harris as sales manager. Mr. Harris will assume his new duties the first of the year. He has been director of sales of the Hawkridge Bros. Co., Boston, and was previously superintendent of the steel department of Peter A. Frasse & Co., Inc., at Buffalo, N. Y. W. W. Lewis, formerly general superintendent of the old Western Reserve Steel Co., Warren, Ohio, and for a time superintendent of the works after the plant was absorbed by the Brier Hill Steel Co., Youngstown, Ohio, has been named superintendent of the Falcon company. Machinery and equipment are now being installed. The mills were furnished by the United Engineering & Foundry Co., Pittsburgh, electrical equipment by the General Electric Co. and cranes by the Morgan Engineering Co., Alliance, Ohio. Paul Wick is vice-president and general manager of the company.

To give D. K. Moore, general manager of the axle division of the Standard Parts Co., Cleveland, additional time for executive duties, Lewis P. Kalb has been named assistant manager of the Stan-Par axle plants. Mr. Kalb is well-known in S. A. E. circles. Since doffing the major's uniform which he wore in 1918, he has been a member of the engineering staff of the Standard Parts organization.

E. S. Hare, president Mercer Motor Co., is to be president of the reorganized Locomobile Co. of America, Bridgeport, Conn. Associated with him will be O. E. Hunt, H. S. Church, Henry Lansdale and C. L. Guyman, until recently chief engineer of motor cars, chief engineer of motor trucks, car sales manager and Government distribution manager, respectively, of the Packard Motor Car Co.

American Manganese Mfg. Co., Bullitt Building, Philadelphia, has opened a Pittsburgh sales office at Rooms 940 to 944, Oliver Building. L. S. Kerchner, formerly general manager of the company's Dunbar, Pa., furnaces, has been placed in charge of this office. Matthew J. Scammel, formerly assistant general manager of the Sparrow's Point plant of the Bethlehem Steel Co., is now general manager of the Dunbar furnaces.

The Torbensen Axle Co., Cleveland, has three new executives: J. D. Smith, formerly works manager for the Timken company, who becomes manufacturing manager of the Torbensen plant; G. W. Veale, production supervisor at the Timken plant, to be production superintendent for Torbensen; G. W. Carlson, engineer for Timken, who will assume the same title at the Torbensen works.

J. C. Ward, director Edgar Allen & Co., Ltd., Imperial Steel Works, Sheffield, England, who has been in New York recently, is now in Chicago and will sail Jan. 16 from San Francisco for Japan, Australia and other countries on a tour of inspection of the branch offices of the company.

Henry P. Thompson, Cincinnati, a district representative of the American Steam Conveyor Corporation, Chicago, has added to his sales engineering staff Albert A. Casey, who will push the sale of the American steam jet conveyor in that territory. Mr. Casey is a mechanical engineer and a graduate of the Ohio State University.

H. G. Bain, until recently attached to the San Francisco sales office of the Midvale Steel & Ordnance Co. sales organization, has joined the Tacony Steel Co., Philadelphia, and will represent it in the upper part of

New York State. Mr. Bain, in addition to a long sales experience, has had considerable practical experience with tool steel, alloy steel and forgings.

Ray P. Farrington, who has for the past several years been the sales representative for Philadelphia and surrounding territory of the Trumbull Steel Co., Warren, Ohio, has resigned to assume the Eastern agencies of the Falcon Steel Co., Niles, Ohio, and the Newton Steel Co., Newton Falls, Ohio, both of which companies have their plants under erection and expect to commence operations about February.

D. M. Howell, formerly with a large New England scrap dealer, has joined Luria Bros. & Co., Inc., New York, iron and steel scrap, taking the place of William H. Hundt as manager of the Boston office, covering New England. Mr. Hundt will return to the New York office in the capacity of buyer.

William C. Redfield, Secretary of Commerce for seven years, has associated with H. P. Wilson in the investment security business under the name of Redfield & Wilson, with office on the sixteenth floor of 50 Broad Street, New York.

E. D. Clarage, who has been manager of the Cleveland branch of the Columbia Tool Steel Co. since July, 1905, has tendered his resignation, to take effect Jan. 1. Mr. Clarage expects to spend a month or two in California and then will return to Cleveland and probably enter business for himself.

Myron T. H. Blanchard, lately with the Hydraulic Pressed Steel Co., Cleveland, is a recent addition to the Cleveland sales force of the Tacony Steel Co., Philadelphia. Mr. Blanchard has had considerable metallurgical experience, having been in the metallurgical departments of the Bethlehem Steel Co. and the Canton Spring and Axle Co., Cleveland.

B. B. Schwartz, who has been with the engineering department of the C. W. Hunt Co., West New Brighton, Staten Island, N. Y., for several years, has been appointed purchasing agent, superseding H. P. Fletcher.

Samuel M. Vauclain, president Baldwin Locomotive Works, Philadelphia, sailed this week for Europe on a business trip.

James A. Green of the Matthew Addy Co., Cincinnati, has left for Florida to spend a part of the winter.

John B. Partridge, Jr., for 14 years manager of the Philadelphia branch of the Charles Dreifus Co., Pittsburgh scrap dealer, has resigned to engage in the iron and steel scrap business with Allen R. Hoffer. Mr. Hoffer has been doing business under the name of Allen R. Hoffer & Co. The name will be changed to the Allen R. Hoffer Co. and articles of incorporation, with capital stock of \$100,000, were filed this week. The company has offices at 1216-17 Pennsylvania Building, Philadelphia. Mr. Partridge's successor with the Dreifus company has not been appointed.

P. D. Wagoner, Harrisburg, Pa., has resigned as president of the Elliott-Fisher Co., manufacturer of billing machines, etc., to become connected with the General Motors Co. at New York, effective Jan. 1. He will remain on the board of directors. K. B. Schley has been elected president to succeed Mr. Wagoner.

A Government infantry and cavalry board, composed of Col. Thomas R. Dugan, president; Col. Albert E. Phillips, Lieut.-Col. Claude B. Sweezy, Lieut.-Col. Julian S. Hatcher and Lieut.-Col. Lee O. Wright, have just paid a two days visit to the Springfield, Mass., armory with a view of standardizing all the products.

The Hill Clutch Co., Cleveland, has appointed D. F. Collins as its Eastern representative in charge of its New York office, 50 Church Street. Mr. Collins has been with the general sales department at Cleveland since receiving his discharge from the service last summer.

Gustav A. Merkt, since 1917 chief engineer for the American Tube & Stamping Co., Bridgeport, Conn., has been appointed chief engineer of the Clinton-Wright Wire Co., Worcester, Mass., with headquarters in that city.

OBITUARY

HENRY R. REA, a well-known resident of Pittsburgh, died in New York on Friday, Dec. 19, of pneumonia. He was a son of William Rea, for many years of the firm of Robinson-Rea Mfg. Co., Pittsburgh, builder of rolls and rolling mill machinery. He was also a son-in-law of the late Henry W. Oliver of Pittsburgh, his wife being a daughter of Mr. Oliver. During the war, Mr. Rea served as a \$1-a-year-man on the Committee on Production of the Council of National Defense. Mr. Rea was a director of a large number of Pittsburgh institutions. He was a trustee of the Henry W. Oliver estate, director of the Union Trust Co., the Mellon National Bank, the Oliver Iron & Steel Co. and the Calumet & Arizona Mining Co.

J. HARTLEY WICKSTEED, who was president of the Institution of Mechanical Engineers in 1903 and 1904, died in England last week. He had long been chairman and managing director of Joshua Buckton & Co., Leeds, England, who have been noted for the manufacture of machine tools, armor plate finishing machines, large lathes, drilling and boring machines and chain and anchor testing equipment. The firm have been makers of the Wicksteed universal testing machine. Mr. Wicksteed headed the delegation from the Institution of Mechanical Engineers which came to the United States in May, 1904, for the joint meeting of the Institution of Mechanical Engineers and the American Society of Mechanical Engineers. He was also a member of the Iron and Steel Institute and the Institution of Civil Engineers.

J. M. WHILE, a well-known British steel manufacturer, news of whose death comes this week, was for many years general manager of the Barrow Hematite Steel Co.'s works. Previous to that he had charge of roll turning at the Gorton works of Bolckow, Vaughan & Co., and had a contract for the entire manufacture of steel rails there. For a time he was connected with the Dowlais Iron Co. He patented a system for rolling tram rails, a vertical rail being placed on the same axis immediately between the journals of the horizontal rolls. He was first to use skids for conveying rails along the hot bank and introduced a number of other mechanical improvements at Barrow.

W. H. H. WOOSTER died at the St. Raphael Hospital, New Haven, Conn., Dec. 17. Mr. Wooster was president of the Seymour Mfg. Co., Seymour, Conn., vice-president of the Seymour Water Co., and vice-president of the H. A. Matthews Mfg. Co., Seymour, Conn. He served as a Connecticut senator in 1905.

EUGENE L. CUSHMAN died at his home in West Hartford, Conn., Dec. 18, aged 65 years. Mr. Cushman was chairman of the board of directors of the Cushman Chuck Co., Hartford, Conn., having formerly been president of that organization.

R. MARSHALL FOX, whose death is noted in our British cables, was at one time chairman of the Harvey Steel Co.

Coke Oven Accidents

Reports received by the Bureau of Mines from operators of coke ovens show a slight decrease in the number of fatalities and an increase in injuries during the year 1918 as compared with 1917. The number of men killed in 1918 was 73; in 1917 it was 76. The total number of men reported employed for 1918 was 32,389 as compared with 32,417 in 1917. The fatality rate in 1918, based on the number of 300-day workers, was 2.06 per 1000; in 1917 it was 2.14. The injury rate in 1918 was 219.64 per 1000 men employed; in 1917 it was 188.59. The reports represent 59,661 beehive ovens and 8,137 by-product ovens. In 1918 the average number of days active was 329, the same as in 1917. The increase in accident rates is attributed to the keeping of more careful records.

Machinery Markets and News of the Works

SUSTAINED BUSINESS

No Abatement Due to the Holidays

Automobile Makers Buying—Burlington List May Be Closed—Higher Priced Castings Predicted

The machine-tool business being booked is everywhere of large volume and shows no abatement with the approach of the holidays. No halting is reported either, because only deferred delivery, generally three months or more from date of order, is promised. Manufacturers are in many cases sold well into next year, and the makers of the larger-sized machines are unwilling to give any guarantee as to the delivery of these tools.

Automobile and accessory makers continue to be steady buyers, and along with car and locomotive builders are the most important purchasers at this time. The most prominent prospective buyers among them

are the Wright Aeronautical Corporation, New Brunswick, N. J.; the Mercer Automobile Co., Trenton, N. J., and the Locomobile Co. of America, Bridgeport, Conn. The H. H. Franklin Mfg. Co., Syracuse, will manufacture motor trucks in addition to its pleasure car line.

There is a notable amount of industrial expansion either under way or in contemplation, 1920 programs of many manufacturers in all parts of the country calling for substantial plant enlargement.

It is rumored at Cincinnati that foundries will raise the price of castings on Jan. 1.

The Chicago, Burlington & Quincy Railroad has revived the list it withdrew last spring, and it is believed will purchase the equipment specified, before the first of the year.

The crane business is somewhat brisker than for the past two or three weeks. The Westinghouse Electric & Mfg. Co., East Pittsburgh, is inquiring for 11 of from 2 to 50 tons capacity for an addition to its South Philadelphia plant.

New York

NEW YORK, Dec. 23.

Instead of the customary lull in machine-tool business during the holiday season, buying keeps up at a rate that is almost unprecedented for this season of the year. One of the largest machine-tool houses reports that its business in 1919 will be fully 75 per cent of 1918, and this is a record volume for any like period in its history except for the war years.

Among the largest buyers of the past week are the American Locomotive Co., the American Car & Foundry Co., the Mergenthaler Linotype Co. and the Magor Car Corporation. The American Locomotive Co. is buying tools for nearly all of its plants, some of its requirements being very heavy machines. The American Car & Foundry Co. is buying principally plateworking machines for its Chicago and Depew, N. Y., plants. The Mergenthaler Linotype Co. has bought lathes, multiple spindle drills, etc., and still has some equipment which will probably be ordered this week. The Magor Car Corporation, Passaic, N. J., will build an addition to its plant and has purchased about \$80,000 worth of new equipment. This company has orders for cars that will take more than a year to fill.

The Otis Elevator Co., New York, has issued a list of about 35 machines, including radial drills, drilling and tapping machines, turret lathes, etc., for its Buffalo plant. C. H. Johansson, Inc., Poughkeepsie, N. Y., is about to release orders for quite a large list of tools. Another Poughkeepsie company, the Liberty Starters Co., continues to buy. The Apollo Magneto Co., Brooklyn, has been buying equipment and the Simms Magneto Co., East Orange, N. J., is reported to be about to enter the market soon for a small list of tools. The Doehler Die Casting Co., Brooklyn, has bought a few machines. The S. S. White Dental Mfg. Co. has also bought a small list of new equipment for its plant at Princess Bay, Staten Island. The High Speed Tool Steel Corporation will build a manufacturing plant at Green Island, Troy, N. Y., and has bought several tools. The Neptune Meter Co., New York, will soon buy a small list of tools. The Buffalo Steel Car Co., Buffalo, is in the market for several plateworking machines.

New financing of the Locomobile Co., Bridgeport, Conn., discloses what is virtually a merger of this company and the Mercer Automobile Co., Trenton, N. J. The Mercer company is buying new equipment and has re-designed its motor. The machine-tool trade expects that more new equipment will soon be inquired for by both the Locomobile and Mercer plants. The Locomobile company will place a light, medium-priced passenger automobile on the market.

The Wright Aeronautical Corporation, New Brunswick, N. J., whose list of about 200 machine tools was published in the Dec. 18 issue of THE IRON AGE is at present occupying the former plant of the Wasson Piston Ring Co. at New Brunswick, but will build a new plant somewhere in New Jersey. The company will manufacture Hispano-Suiza motors and Simplex automobiles.

Among export inquiries is one from the Japanese Navy for several tools. Commander Weston of the British Navy, whose temporary headquarters in New York is at 21 East Fortieth Street, is sending out inquiries for a large list of equipment for a naval air station for Greece. An improved demand for machine tools for shipment to England comes as the result of the scarcity of British tools due to the protracted strike of molders in that country. Some of the British machine-tool plants are shut down on account of inability to get castings.

Alfred Herbert, Ltd., 54 Dey Street, New York, has opened a department for second-hand machinery in England and is in the market for used tools of standard makes in good condition for shipment to that country.

The demand for used tools is reported by New York dealers to be exceptionally brisk. For some time there has been a scarcity of large tools such as planers and boring mills, but now there is a good demand, which apparently cannot be satisfied, for medium-sized machines of certain standard types. THE IRON AGE has received inquiries for various machines, these inquiries including Norton and Heald grinders, Hendey lathes, Fellows gear shapers, Landis bolt cutters and Bullard vertical turret lathes.

Business in the crane field shows an improvement over the past two or three weeks. A few export inquiries are in the market from countries where the exchange rate is either low or against the United States. The Westinghouse Electric & Mfg. Co., East Pittsburgh, is inquiring for 11 electric traveling cranes, ranging from 2 to 50 tons, for the Essington plant, to which an addition is being built. The city of St. Louis is in the market for two 2½-ton double track gantry cranes for the North Market Street Municipal Docks. The city of Seattle, Wash., has a commission investigating various types of cranes in use, and will probably soon be in the market. A set of standard specifications to submit for bids is being prepared by the Material Handling Machinery Manufacturers' Association, New York, for the Pan-American Dock & Terminal Co., for which the city of New York is constructing two piers at Staten Island.

The Standard Oil Co. has purchased for the Bayonne plant a 30-ton locomotive crane with 50-ft. boom for standard gage track. From Manning, Maxwell & Moore, the Great Western Electric Co. of California has purchased a 175-ton electric

traveling crane for its Caribou station. The Pier Machine Co., a subsidiary of the Barber Steamship Line, Brooklyn, N. Y., has purchased from the Shepard Electric Crane & Hoist Co. two 10-ton overhead traveling cranes for a new machine shop. The Sun Shipbuilding Co., Chester, Pa., has purchased four 15-ton and two 20-ton cranes for its new shipways from the Pawling & Harnischfeger Co.

Several large orders have been placed for Connecticut universal grinding machines. J. F. Renfro & Co., manufacturers of auto parts, ordered 200 machines. Other large orders were secured from Fairbanks, Morse & Co., Garvin & Co., and Manning, Maxwell & Moore, Inc. The Middlesex Machine Co., Middletown, Conn., reports enough orders booked to keep operations at capacity until 1921.

The Bayles Shipyard, Inc., Port Jefferson, L. I., acquired some time ago by the Emergency Fleet Corporation, has been purchased by Arthur Allen for a consideration of \$2,225,500. The yards have an area of about 7½ acres, with facilities for the construction of steel vessels up to 5000 tons capacity. Mr. Allen has heretofore been connected with the Shipping Board as assistant to Robert L. Hague, and has tendered his resignation. It is understood that he will act as manager at the yard.

Charles D. Barney & Co., 15 Broad Street, New York, and associates, have acquired property of the American Metal Co., Ltd., 61 Broadway, recently offered for sale by the Alien Property Custodian. The acquisition represents \$5,750,904.

The American International Steel Corporation, 120 Broadway, New York, a Delaware corporation and subsidiary of the American International Corporation, has filed notice of change of name to the International Steel Corporation. The company has leased the entire third floor of the building at 51 Chambers Street and will establish new offices there about Feb. 1. The Allied Machinery Corporation, a subsidiary of the same parent organization, has quarters in the same building.

The Chatham Machine & Tool Works, 128 Mott Street, New York, has filed notice of dissolution.

The Western Electric Co., 195 Broadway, New York, has leased a seven-story building at 537-545 Greenwich Street for a term of years at an aggregate rental of \$300,000, for a new local establishment.

The F. N. Dubois Co., New York, has been incorporated with a capital stock of \$350,000 by A. D., F. D. and F. W. Blauvelt, Catskill, N. Y., to manufacture steam specialties, gas fittings, etc.

The Collins Motors, Inc., Huntington, L. I., is planning a new one- and two-story assembling plant, 80 x 340 ft. to cost \$75,000, and a general works building to cost \$25,000.

The Quarnstrom Automatic Reverse Machine & Mfg. Co., Brooklyn, has been incorporated with a capital stock of \$100,000 by A. Quarnstrom, G. Boquist and H. Peterson, 11 East Fourth Street.

The Brooklyn Pulley Co., Brooklyn, has been incorporated with a capital stock of \$100,000 by F. A. Chappel, A. C. Greenfield and F. E. Chattaway, 867 Seventy-first Street, to manufacture pulleys and hangers.

Francis P. Garvan, Alien Property Custodian, 110 West Forty-second Street, New York, has arranged for the sale of property of the Perfection Furnace Pipe Co., 602 Broadway, Toledo, Ohio, manufacturer of tin pipes, metal goods, etc., on December 30.

The Segal Lock & Hardware Co., 155 Leonard Street, New York, has increased its capital stock from \$175,000 to \$275,000.

Improvements and extensions to cost about \$10,000 will be made in the machine shop of the LeRoy Holding Co., 214 Fulton Street, New York, at 129-137 Leroy Street.

The W. M. Levett Corporation, New York, has been incorporated with a capital of \$105,000 by W. M. Levett, J. W. Collins and L. E. Valcourt, 441 East Twenty-third Street, to manufacture tools, implements, etc.

The Ward Leonard Electric Co., Mt. Vernon, N. Y., manufacturer of electrical products, has been reorganized with an active capital of \$147,000.

William J. Millard & Co., Inc., New York, has been incorporated with a capital stock of \$25,000 by William J. Millard, R. F. Tillmanns and H. P. Miller, 113 Fulton Street, to manufacture hardware products.

The Weber Electric Co., Campbell Avenue, Schenectady, N. Y., has increased its capital stock from \$25,000 to \$100,000.

The Vitreous Enameling & Stamping Co., 11 East 167th Street, New York, has completed plans for a one-story plant, 70 x 172 ft., on Sedgwick Avenue and 171st Street, to cost \$80,000.

The Stern Container Co., New York, has been incorporated with a capital stock of \$36,500 by I. E. Meller, C. L. Raskin,

51 Chambers Street, and H. P. Smith, 406 Seventh Street, Brooklyn, to manufacture metal containers, etc.

The Giant Engineering & Commerce Corporation, New York, has been incorporated with a capital stock of \$100,000 by M. F. Cavallion, 601 West 151st Street, New York; J. M. Merle and J. R. Wemlinger, 7610 Fourth Avenue, Brooklyn, to manufacture machinery and equipment.

The Radium Co. of Colorado, Inc., 50 Union Square, New York, has increased its capital stock from \$600,000 to \$1,200,000.

The International Motor Co., 252 West Sixty-fourth Street, New York, has leased the Frederick Tench plant at Borden and Review avenues, Long Island City, for a new repair and motor service works.

The General Machine Co., Paterson, N. J., has been incorporated with a capital stock of \$250,000 by I. B. Hebenstreit and Hugh Townsley, Caldwell, N. J., to manufacture machinery and parts.

The Wall Rope Works, Beverly, N. J., has awarded a contract to the Turner Construction Co., 1713 Sansom Street, Philadelphia, for a four-story addition, 60 x 170 ft., to cost about \$150,000.

Fire, Dec. 15, destroyed the works of the Hackensack Auto Service Co., Hackensack, N. J., with loss estimated at \$50,000.

The Simms Magneto Co., North Arlington Avenue, East Orange, N. J., has had plans prepared for a two-story addition, 30 x 151 ft., to cost \$29,000.

The Ordnance Department, Washington, is considering the erection of a number of new industrial buildings at the Picatinny Arsenal, near Dover, N. J., including a new shell sectioning works to cost \$10,000; addition to machine shop, \$15,000; magazine buildings, \$25,000; power plant extensions, \$25,000, and extensions and improvements to a number of works buildings to cost about \$75,000. A number of powder buildings at the plant were destroyed by fire, following an explosion Dec. 18.

The plant and equipment of the Motor Compressor Co., 52 Dickerson Street, Newark, N. J., has been acquired at a public sale by Clifford A. Gould, 115 Lafayette Street, for a consideration of \$55,000.

The Advance Metal Stamping Co., Newark, N. J., which recently acquired a plant building now occupied at 156 Leslie Street, has acquired additional property, 75 x 100 ft., at 158-162 Leslie Street, for expansion.

The Duratex Co., 768 Frelinghuysen Avenue, Newark, N. J., manufacturer of rubber products, has filed plans for a one-story manufacturing works, with machine shop, to cost \$179,000.

Lipman Schumacher, 1124-28 First Avenue, New York, operating a machine and repair shop, has had plans prepared for extensions in the present two-story building, 25 x 65 ft., to cost about \$20,000.

The Thompson Vehicle Spring Co., Inc., New York, has been incorporated with a capital stock of \$100,000 by J. S. Epstein, A. J. Brothers and I. Esmond, 2 Rector Street.

The Van Dyke Smelting & Refining Works, 94 Van Dyke Street, Brooklyn, has increased its capital stock from \$300,000 to \$500,000.

Plans have been drawn for a machine and repair shop, 124 x 153 ft., one story, to be erected by B. Hennessey, Albany.

The Lewis & Weller Mfg. Co., Utica, N. Y., has let contract for a two-story factory addition on Lincoln Avenue, to cost \$15,000.

VanSlyke & Horton, 471 Broadway, Albany, have let contracts for a three-story factory building on Orange Street, 34 x 103 ft., to cost \$40,000. G. W. Horton is president.

The Barnet Leather Co., 81 Fulton Street, New York, is building a three-story boiler house addition at its Little Falls, N. Y., plant, to cost \$7,000.

New England

BOSTON, Dec. 22.

A number of orders for machine tools have been booked by local representatives the past week for use in the Providence, Worcester, Springfield and other districts. Enough new business is expected to be closed within the next few days to bring the value of December bookings up to a much larger figure than was anticipated the early part of the month. An excellent demand from textile machine interest continues, especially for production machines needed to reduce the cost of labor, the Saco-Lowell Shops being the most active buyer at present. Sales of screw machines have been few and far between of late, but many inquiries are in the market. There is a big demand for screw machine products, one of the largest

producers having been obliged to cut into its reserve stocks materially. Deliveries on standard makes of pipe machines are fully six months behind.

There has been a noticeable slowing up in the demand for second-hand machines, but prices hold strong. Many machines with parts missing are on the market and dealers are finding it expensive to replace these.

Some crane manufacturers have notified local representatives that prices will advance after Jan. 1, owing to the high cost of labor and materials. At this writing there is not a prospective crane order in the market.

The Rolls-Royce Co. of America is moving machinery from Cleveland, where it was engaged on aeroplane engine work during the war, to the plant recently purchased at Springfield, Mass. Owing to the congestion of machinery moving in and out of the building it will be some weeks before it is installed and the production manager, who is on his way here from England, can look it over and determine what is needed. The management is asking for catalogs of machine-tool manufacturers. The Stevens-Duryea Co. is also requesting catalogs. The past week it bought a few lathes and other equipment to round out purchases made earlier in the year and will do no more buying until a thorough inspection of machines now owned has been made. R. M. Wyatt has been assisting Mr. Nichols in tool purchases.

The Greenfield Tap & Die Co., Greenfield, Mass., is in the market for lathes, drilling machines, threading and tapping equipment, but wants prompt deliveries. It has been picking up some second-hand machines. The Boston & Albany Railroad is again in the market for a small amount of equipment. The Collyer Insulated Wire Co., Pawtucket, R. I., is building an addition and is in the market for automatic machines. The General Fire Extinguisher Co., Providence, is asking prices on two special machines. The Whitting Paper Co., Holyoke, Mass., is in the market for a planer. The Mead-Morrison Mfg. Co., Boston, is in the market for forge shop equipment. The General Electric Co., Lynn, continues to buy odd machines, having contracted for some high-priced ones since last reports. It is intimated that the company will not place its 1920 requirements on the market before February or March. The American Steel & Wire Co., Worcester, has just bought a small amount of miscellaneous equipment. The National Equipment Co., Springfield, Mass., has bought two 8-ft. boring mills, some planers, a gear cutter and miscellaneous tools. The Goodell-Pratt Co., Greenfield, Mass., has bought a Norton grinder. Joseph Benn & Sons, Inc., Graystone, R. I., woolen goods, recently bought a shaper. The company plans to erect another mill abroad. The Osgood Bradley Car Co., Worcester, Mass., which is manufacturing front and rear assemblies for the Standard Motor Car Co., has just placed orders for miscellaneous tools. John Bath & Co., Worcester, have been buying lathes and their requirements have not yet been filled. The Lapointe Machine Tool Co., Hudson, Mass., has ordered two grinders, and the Dial Needle Co., Tilton, N. H., some small second-hand grinders, as well as lathes, drills, etc.

Contrary to report, the American Tap & Die Co., Greenfield, Mass., is not in its new plant as yet. The company is extremely busy and behind on deliveries and is working on some orders placed as far back as 1917.

The Standard Plunger Elevator Co., Worcester, Mass., which has been making a planer, is preparing for the manufacture of other machine-tools on a much larger scale. Plans are being worked out for a substantial increase to its plant.

The General Electric Co., Pittsfield, Mass., will erect a building on East Street opposite the foundry to be used for wire enameling work. It is expected to be ready for occupancy April 1.

The National Equipment Co., 560 North Main Street, Springfield, Mass., manufacturers of metal goods, has awarded a contract to the Adams Ruxton Construction Co., 33 Lyman Street, for the erection of a one-story addition, 150 x 154 ft., to cost \$30,000.

The Billings & Spencer Co., Hartford, Conn., manufacturer of drop forgings, etc., has had plans prepared for the erection of an addition to its plant to cost about \$25,000, including equipment. The company has increased its capital stock from \$750,000 to \$1,000,000.

The United Shoe Machinery Co., Boston, Mass., will build a new plant at Beverly to cost about \$450,000, including equipment.

Buffalo

BUFFALO, Dec. 22.

The Ellicott Machine Co., Buffalo, recently incorporated, has established a machine shop at 160-162 Ellicott Street. David Wilkinson, W. Bush and J. E. Kulkowski are the promoters.

The Selden Motor Vehicle Co., Probert Street and East Avenue, Rochester, has had plans prepared for a two-story concrete addition, 100 x 140 ft., to cost \$58,000.

A one-story foundry addition, 37 x 96 ft., is to be built by the Galusha Stove Co., Thirteenth Street and Glenwood Avenue, Rochester. Plans have been drawn.

The Niagara Radiator & Boiler Co., North Tonawanda, N. Y., is preparing plans for a plant addition at Oliver Street and the Erie Railroad. E. C. Andrews is president.

The Erie Malleable Iron Works, Erie, Pa., is planning for a four-story plant addition, 60 x 40 ft.

The Buffalo Knife Co., Buffalo, has been incorporated with a capital stock of \$25,000 by E. M. Bailey, E. S. Pease and W. R. Daniels, 903 D. S. Morgan Building, to manufacture knives and cutlery.

The Sherwood Mfg. Co., 1710 Elmwood Avenue, Buffalo, manufacturer of lubricating devices, has increased its capital stock from \$50,000 to \$100,000.

The plant and business of the Hession Tiller & Tractor Corporation, Dewey Avenue, Buffalo, has been purchased at a receivers sale by M. D. B. Smith and associates, comprising a committee of stockholders, for \$130,000. The property has been appraised at \$152,624.

The Rochester Mfg. Co., 29 Halstead Street, Rochester, N. Y., manufacturer of automobile parts, has awarded a contract to Alexander, Shumway & Utz, 409 Exchange Place, for a three-story plant, 50 x 175 ft., on Rockwood Street, to cost \$100,000.

Wilcox Brothers, Inc., Binghamton, N. Y., has been incorporated with a capital stock of \$50,000 by H. H. W. H. and B. W. Wilcox, to manufacture concrete-mixing equipment and road machinery.

The H. H. Franklin Mfg. Co., 302 South Geddes Street, Syracuse, N. Y., manufacturer of automobiles, is planning for enlargements to provide for the manufacture of motor trucks, a new department of operation. It is planned to produce a one-ton, pneumatic-tired truck, and to inaugurate manufacture in an entirely separate plant designed for this purpose during the coming year. James L. Yarian has been appointed chief engineer in charge of the new department. The company has arranged for a one-story addition at its present plant, 50 x 75 ft. John Wilkinson is vice-president.

The Niagara Sprayer Co., Middleport, N. Y., manufacturer of dust spraying and other machinery, has acquired property on Telegraph Road, Medina, for a new plant. It has increased its capital from \$500,000 to \$3,000,000.

The Franklin Die Casting Corporation, Syracuse, N. Y., has been incorporated with a capital stock of \$25,000 by H. L. Franklin, A. B. Palica and H. C. Skinner.

The Brown Co., 213 Bellevue Avenue, Syracuse, N. Y., manufacturer of automobile bolts, etc., will build a two-story plant on Chester Street, 50 x 98 ft., to cost about \$50,000.

Plans are out for a plant addition, 40 x 100 ft., two stories, for the Sedgewick Machine Works, Sedgewick, N. Y.

The Rochester Mfg. Co., Inc., 29 Halstead Street, Rochester, has had plans drawn for a three-story factory building, 50 x 178 ft., of reinforced concrete, which it will erect on Rockwood Street, at an estimated cost of \$100,000.

Plans are being prepared for a machine shop to be erected by the General Electric Co. at its plant at Erie, Pa.

The Hudson Brass Works, Ogdensburg, N. Y., will erect a factory, 30 x 100 ft., for which plans have been prepared.

The American Radiator Co., Buffalo, has awarded contract for a machine shop addition, 100 x 220 ft., two stories, to cost \$35,000, at its "Pierce plant," Elmwood Avenue and the New York Central Belt Line.

The American Car & Foundry Co., 165 Broadway, New York, is taking bids for an addition to its car building shops at Buffalo, 100 x 827 ft., and requires 1500 tons of structural steel, including crane runways.

The John W. Cowper Co., Buffalo, has been awarded contract for erection of the initial unit, 80 x 300 ft., of the Buffalo Steel Car Co., Liberty Building, Buffalo, at its new plant, Walden Avenue, the New York Central Railroad and the Niagara Falls Power Transmission Line, East Buffalo.

Philadelphia

PHILADELPHIA, Dec. 22.

The Gomery-Schwartz Motor Car Co., 128 Broad Street, Philadelphia, has filed plans for a new eight-story, brick and reinforced-concrete machine works and automobile service building, 127 x 446 ft., at Twenty-fourth and Market streets, to cost about \$1,000,000, including equipment.

The Malmin Cutting Machine Co., Philadelphia, has leased the building at 616 Arch Street for a local works.

The Phil-Fibre Board Mills, Inc., Philadelphia, has been incorporated with a capital stock of \$500,000 by Chester A. Simmons, 6035 Columbia Avenue; Esther Newman, 4562 Merion Avenue, and I. George Levene, 6037 Columbia Avenue.

The plant of John M. Smith & Sons, 1423-27 Spring Garden Street, Philadelphia, manufacturers of tanks, has been disposed of to other interests. The property has been held at \$110,000.

The Philadelphia Sash Weight Co., Greenwood Avenue, near Twenty-second Street, Philadelphia, has filed plans for a one-story addition to cost about \$4,000.

A boiler plant, 31 x 79 ft., to cost about \$25,000, will be erected by the Kensington Hygeia Ice Co., Sepviva and Huntingdon streets, Philadelphia.

The Standard Garage, 1205 North Fourth Street, Philadelphia, has arranged for a two-story machine and service works, 107 x 200 ft., at Rockland Avenue and Sixth Street, to cost about \$90,000, including equipment.

The Ceramic Equipment Co., Trenton, N. J., recently incorporated with a capital stock of \$10,000, has established a local plant for the production of drying and other clay machinery. David Crossley of the Crossley Machine Co., State and Monmouth streets, is president; Joseph L. Buckley is general manager.

The Mercer Automobile Co., Trenton, N. J., recently acquired by new interests, is planning to increase its plant capacity from 1000 to 3000 cars per year. The present factories will be doubled in size at a cost of about \$650,000, and equipment provided for the employment of about 1000 men instead of 450 as now. It will be closely allied with the Locomobile Co. of America, Emlen S. Hare being president of both organizations. This latter organization will be reorganized as the Locomobile Co., and the works at Bridgeport Conn., will be enlarged to include the manufacture of medium and high-priced pleasure automobiles, as well as commercial trucks of from 1 to 5-ton capacity.

The Delaware Shipbuilding & Repair Co., 308 Chestnut Street, Philadelphia, is planning rebuilding its machine shop and other buildings at Beach and Erie streets, Camden, N. J., recently destroyed by fire. The work is estimated to cost about \$50,000.

The American Wire Fabrics Co., Mount Wolf, Pa., has placed its plant on a five-day week operating schedule.

Fire, Dec. 9, destroyed a section of the plant of the United States Asbestos Co., Manheim, Pa., with loss estimated at \$50,000.

R. Shipman, Sunbury, Pa., is planning the erection of a three-story machine shop, 60 x 70 ft., on Susquehanna Avenue, near Reagan Street, to cost about \$60,000.

A number of electric light and power companies in Pennsylvania have made application to the Public Service Commission, Harrisburg, for permission to issue bonds and stock for proposed extensions and betterments, as follows: Penn Central Light & Power Co., Altoona, bonds, \$129,000; Eastern Pennsylvania Railways Co., Pottsville, bonds, \$42,500; Suburban Gas & Electric Co., Philadelphia, bonds, \$45,000; Lehigh Valley Light & Power Co., Allentown, stock, \$46,900; State-Centre Electric Co., Clearfield, stock, \$100,000; Chester Valley Electric Co., Coatesville, bonds, \$630,000, and the Lehigh Industrial Power Co., Philadelphia, bonds, \$33,500.

The Reading Bottle Stopper Co., Reading, Pa., has been incorporated with a capital stock of \$40,000 by Hyman and Joseph Liever, Samuel Furman and David Lipman.

The Nazareth Foundry & Machine Co., Nazareth, Pa., has commenced the erection of a new machine shop, the equipment to be largely motor-driven. The company is devoting production to sugar-mill machinery, and is said to have orders for the next 24 months.

The Bethlehem Motors Corporation, Allentown, Pa., is arranging for plant enlargements to increase its capacity in 1930 from about 4500 motor trucks to 8000 trucks per year. Arthur T. Murray is president.

Property of the Victor Balata & Textile Belting Co., Easton, Pa., will be sold by Francis P. Garvan, Alien Property Custodian, on Jan. 5.

The Ajax Rubber Co., Breunig Avenue, Trenton, N. J., manufacturer of automobile tires, is considering plans for a branch plant at Jackson, Mich., to cost about \$500,000. The proposed works will provide for the employment of over 700 men.

Baltimore

BALTIMORE, Dec. 22.

The Liberty Tool Corporation, 1318 Munsey Building, Baltimore, has been incorporated with \$600,000 capital stock by Stanton Ennes, E. Oliver Grimes, Jr., and Harry R. Warnock, to manufacture tools and mechanical equipment.

J. H. Gerahty, rear of 1022 Cathedral Street, Baltimore, will establish a tool and machine shop.

The Curtis Bay Copper & Iron Works, Curtis Bay, Baltimore, will build an addition, 75 x 230 ft. J. W. Lehr is manager.

The Fleigh Motor & Tire Co., Hagerstown, Md., will build a garage to cost about \$25,000 and will install lathes, drill presses and other machinery, upon which prices are wanted. Robert B. Fleigh is proprietor.

Edward A. Whaley & Co., Norfolk, Va., will install additional machine-shop equipment.

M. A. Glasser, Norfolk, Va., is said to be planning for a machine shop to cost about \$6,000.

The Charlotte Electric Repair Co., Charlotte, N. C., will build a plant to cost about \$60,000 and will install machinery for heavy electrical repair work.

The Eastern Shore Shipbuilding Co., Sharptown, Md., has been acquired by John H. Smith, Salisbury, Md., and associates.

Edward A. Whaley & Co., Norfolk, Va., are planning to install machine tools, motors and other equipment for increased capacity.

The Unger Storage Battery Co., Twelfth and Madison streets, Wilmington, Del., has filed plans for an addition to cost about \$8,000.

The plant and equipment of the Artillery Fuse Co., Church and F streets, Wilmington, Del., have been acquired at a public sale by the Manufacturers' Contracting Co., representing the duPont interests, for about \$80,000.

The Winnsboro Mills, Winnsboro, S. C., is having plans prepared by Lockwood, Greene & Co., Atlanta, Ga., for an addition to its cord fabric plant for automobile tire manufacture to cost about \$3,000,000. The machinery and equipment installation is estimated at \$1,000,000. The entire output of the enlarged plant will be used by the United States Rubber Co., which has a contract with the Winnsboro company until 1927. Arrangements have been made for a preferred stock issue of \$4,000,000 for the work.

The American Sugar Refining Co., 117 Wall Street, New York City, is perfecting plans for its proposed sugar refinery in the Locust Point district, Baltimore, to be one of the largest in the country, and estimated to cost over \$6,000,000, including equipment.

The Agricultural Implement Co., Athens, Ga., has been incorporated with a capital stock of \$50,000 by P. S. Johnson, W. H. Chafin and C. N. Hodgson.

The Carolina Shipbuilding Corporation, Wilmington, N. C., affiliated with the George A. Fuller Co., 175 Fifth Avenue, New York City, is arranging for the continuance of the yard as a private enterprise, following the completion of contracts with the Government. The yard is equipped for the production of fabricated steel vessels and was built at a cost of about \$3,500,000. Lorenzo C. Dilks is president.

Chicago

CHICAGO, Dec. 22.

The only large inquiry before the local machine tool trade is that of the Chicago, Burlington & Quincy Railroad. This list, which was first issued last spring, then withdrawn, and again revived this fall, will finally be purchased, it is now believed, before the first of the year. The aggregate of business booked by Chicago dealers has not decreased materially with the approach of the holidays. Inquiry continues active and numerous orders are being written despite the fact that practically no manufacturers will promise delivery inside of three months.

The Hurley Machine Co., West Twenty-second Street and Fifty-fourth Avenue, Cicero, Ill., has purchased four milling machines and two hand screw machines. The Union Special Machine Co., 400 North Franklin Street, Chicago, has bought miscellaneous equipment, including four upright drills and two hand screw machines. The Knight Light & Soda Fountain Co., 351 West Chicago Avenue, Chicago, is buying equipment, and the Buda Co., Harvey, Ill., and the Chicago Coated Board Co., 420 East North Water Street, Chicago, have made small purchases.

The Packard Auto Open Body Co. has awarded a contract to the E. W. Sproul Co. for the construction of a three-story plant, 120 x 400 ft., at 104th Street and Erickson Avenue, Chicago, to cost \$1,100,000.

The Elgin Motor Car Sales Co., 2427 South Michigan Avenue, Chicago, has let a contract to the Barrett Construction Co., for the erection of a three-story automobile service station, 50 x 150 ft., at 2316-18 Indiana Avenue, to cost \$48,000.

J. H. Goldberg, 3535 West Twelfth Street, Chicago, has let contracts for the construction of a one-story plant, 50 x

125 ft., to 820-22 South Tripp Avenue, to cost \$12,000. He will manufacture moving picture machines and accessories.

The Continental Can Co., 111 West Washington Street, Chicago, has awarded contract to the E. W. Sproul Co. for the construction of a plant, 90 x 175 ft., at 3815-3821 South Ashland Avenue, to cost \$150,000.

The Jewell Electrical Instrument Co., 1650 Walnut Street, Chicago, has let contracts for the erection of a three-story factory, 50 x 100 ft., at 1640-42 Walnut Street, to cost \$50,000.

Edward H. Wachs & Co., manufacturer of machinery, 1529 Dayton Street, Chicago, has let a contract for the construction of a one and two-story addition, 100 x 125 ft., to cost \$50,000.

The Western D-G Storage Battery Co., Ogden, Utah, recently incorporated with \$200,000 capital stock, will erect a large plant in that city.

The Advance Machine Co., 4645 Ravenswood Avenue, Chicago, has let contracts for the erection of a second-story top addition, 58 x 100 ft., to cost \$12,000.

The Donaldson & Fisher Mfg. Co., manufacturer of machinery, 1654 Besley Court, Chicago, has leased the main floor of the building at 1427-43 Carroll Avenue, for a term of years from Jan. 1.

The Roszell Ice Cream Co., Peoria, Ill., will soon commence the construction of a four-story factory at Washington and Oak streets. The ground floor will be used as a garage and will be equipped with a complete repair shop.

The Mechanical Equipment Co., Union Stock Yards, Chicago, a subsidiary of Swift & Co., has completed plans for a new three-story plant, 52 x 112 ft., at Thirty-ninth and Loomis Streets, to cost \$40,000.

The Jones Electrical Co., 2837 South State Street, Chicago, is having plans prepared for the construction of a one and two-story plant, 125 x 125 ft., at Twenty-ninth Place and Calumet Avenue, for the manufacture of electric automobile devices. The works will cost about \$60,000.

The Anderson-Clausen Motor Co., 4701 West Madison Street, Chicago, has arranged for the erection of a one and two-story machine and automobile service works, 50 x 175 ft., at 4633 West Washington Street, to cost about \$60,000.

The Chicago Pneumatic Tool Co., Chicago, has increased its capital stock from \$7,500,000 to \$13,000,000.

The Economy Fuse & Mfg. Co., 328 West Kinzie Street, Chicago, manufacturer of electric fuses, etc., has completed plans for a one-story and basement building, 130 x 264 ft., at 2707-21 Greenview Avenue, to cost about \$135,000, including equipment.

The Chicago Malleable Castings Co., 120th Street and Racine Avenue, Chicago, has closed contracts for an addition to its plant at West Pullman, increasing its tonnage output about 40 per cent. Orders for new equipment, including tumbling barrels, core ovens and molding machines have been placed. Contracts specify the buildings are to be turned over by the contractors Feb. 1.

Catalogs Wanted

The Nebraska Aircraft Corporation, Lincoln, Neb., desires catalogs and price lists from manufacturers and jobbers making and handling sheet steel, sheet copper, aluminum, brass, smooth iron wire, copper and steel wire cable, brass and copper tubing, steel and bar iron and other metals.

The Twin City Steel Mfg. Co., 2652 Thirty-fourth Avenue, South, Minneapolis, Minn., has incorporated for \$100,000 to manufacture pipe nipples, perforated extension bar, pipe straps, etc., and desires catalogs from concerns handling machinery and material for this line of work.

Detroit

DETROIT, Dec. 22.

The Standard Motor Parts Co. has purchased from the Denizer Mfg. Co. the four-story factory at the corner of Catherine and Hastings streets, Detroit. It has about 35,000 sq. ft. of floor space.

The former service building of the Ford Motor Co., at Woodward Avenue and the Grand Boulevard, has been leased by the Fisher Body Co. for five years. It will be used for finishing automobile bodies.

The American Spring & Wire Co., Camden, N. J., has purchased a factory in Holly, Mich., which it will use for the manufacture of wire springs in automobile valves. Within a few months the company expects to erect a plant of its own at Holly.

The H. P. Co., Detroit, a \$200,000 corporation, manufacturers of toy pistols and abrasive wheel truers, is moving to Midland, Mich., where it will commence operations within a short time.

A. H. Stokes, St. Johns, Mich., will move his factory for the manufacture of bent tubing and stamping machinery to Owosso, Mich.

The Melling Forge Co., Lansing, Mich., will spend \$30,000 in the next few months for an addition, 60 x 50 ft., and for new equipment.

The Irvington Machine Works, 1515 Plainfield Avenue, N.E., Grand Rapids, Mich., has been incorporated to manufacture a new floor-swing cut-off saw for wood-working shops.

The Wolverine Tube Co., formerly located at Thirty-third Street and McGraw Avenue, Detroit, has moved into its new plant at 611-625 Central Avenue, where it has larger facilities for producing its line of seamless brass and copper tubing. The works cover two and one-half acres and have 30,000 ft. of floor space.

The business of the Smalley General Co., Bay City, Mich., has grown so rapidly that a larger capitalization has become necessary to increase its plant and other facilities. The capital has been raised from \$50,000 to \$525,000, all paid up. It has no bonded mortgage or other funded indebtedness, nor any floating indebtedness save current accounts. The management and officers remain unchanged. The new stockholders are: John W. Eddy, of the Skinner-Eddy Corporation, Seattle, Wash.; James G. Eddy, of the Ferry-Baker Lumber Co., Everett, Wash.; R. B. Eddy, of the Eddy Investment Co., Bay City, Mich.; Howard F. Smith, of the Michigan Pipe Co., Bay City, Mich., and Dominion Sugar Co., Chatham, Ont., and J. R. Decker, sales manager of the Smalley General Co.

Cincinnati

CINCINNATI, Dec. 22.

Local machine tool builders are still busy trying to catch up on deliveries, which are still several weeks behind. Orders continue to come in at a steady rate, and for the larger tools especially no guarantees of delivery will be given. Manufacturers report their output sold well into next year. No advance in prices has been announced the past week, but it is rumored that foundries will raise the price of casting the first of the year, which will naturally affect tool builders. Automobile companies continue steady buyers, an order for 17 radial drills having been received from a Detroit house. Orders are coming from all sections of the country. Builders of electrical and ice-making machinery also report conditions exceptionally brisk, and deliveries far behind. Some export orders are being secured, and one concern is making steady shipments to France, Belgium, South Africa and Australia.

The Peerless Foundry Co., Cincinnati, has increased its capital stock from \$200,000 to \$500,000.

E. E. Elford, Commercial Building, Columbus, Ohio, was awarded the contract for the erection of the plant for the Knox Tire & Rubber Co., Mt. Vernon. The building will be 100 x 225, three stories, and will cost about \$170,000. Work is expected to commence immediately.

The Dayton Power & Light Co., Dayton, Ohio, it is understood, will double the capacity of its power plant at Miller's Ford. O. H. Hutchings, associate general manager, is now in New York to place contracts for a 30,000-hp. steam turbine and two large boilers. It is understood that this extra equipment, with the cost of installation, will entail an expenditure of \$800,000.

It is reported that the Austen Western Road Machinery Co., Chicago, has secured an option on a large tract of land at Columbus, Ohio, and will build a branch assembling and display plant. The company manufactures road-making machinery.

The Standard Register Co., Dayton, has secured a permit to build a factory to cost \$37,000. The contract, it is understood, has not yet been awarded.

The Miami Brass & Foundry Co., Dayton, will build a three-story, concrete factory, 75 x 120 ft., to cost with equipment about \$100,000. Ben Semmelman is president.

Michael Conway & Co., machinists, Cincinnati, have purchased property on the west side of Harrison Avenue, south of Queen City Avenue, and will soon commence the erection of a brick building, 60 x 100. The company is in the market for various machine tools, shop trucks, and a hardening furnace.

The Advance Machine Co., Van Wert, Ohio, is in the market for one planing machine, 42 x 42 in., 12 to 14-in. bed, and one 36 x 36-in. planing machine, 10 to 12-in. bed, the machines to be fitted with two heads on the cross rail and two side heads. The company also wants for prompt shipment one 4, 5 or 6-ft. radial drilling machine, second-hand preferred.

St. Louis

ST. LOUIS, Dec. 22.

The Holmes County Oil Mill Co., Lexington, Miss., will equip a plant to cost about \$50,000. M. W. Warren and others are interested.

The Century Electric Co., St. Louis, will erect a six-story addition, 90 x 120 ft.

The Emerson Electrical Mfg. Co., St. Louis, will erect an eight-story addition, to cost with equipment \$600,000.

The Christopher & Simpson Iron Works Co., St. Louis, will erect a building 135 x 500 ft., install 20-ton traveling cranes and quadruple the capacity of the plant.

The Butler Locomotive Safety Appliance Co., Fort Towson, Okla., C. C. Cutler and others interested will equip a \$50,000 plant for the manufacture of special devices.

F. P. Johnson, 140 West Main Street, Oklahoma City, Okla., will equip a three-story machine shop, 75 x 140 ft.

The Citizens Ice & Fuel Co., Conway, Ark., will equip a 35-ton ice-making plant. W. C. Daugherty is manager.

The Clacasiu Mercantile Co., Lake Charles, La., will install about \$25,000 worth of ice-making equipment.

The Medford Ice Co., Medford, Okla., Earl S. Henry, proprietor, will install oil engines, compressor, and other equipment.

The Somerville Iron Works, Somerville, N. J., manufacturer of cast iron soil pipe, fittings, etc., has awarded contract to the Austin Co., Cleveland, for the erection of a new plant at Chattanooga, Tenn., on a site aggregating 30 acres. The proposed plant will have an initial annual capacity of about 50,000 tons and with equipment is estimated to cost in excess of \$1,000,000.

The Gadsden Pipe Co., North Ninth Street, Gadsden, Ala., will build a new one-story foundry, 25 x 500 ft., with installation to include a 90-in. cupola, motor-driven blower, etc.

The Western Petroleum Co., Louisville, Ky., is planning for the erection of additions to its local plant to cost about \$300,000. The work will include a new machine shop, cooperage works, pumping and boiler plants and other buildings.

The Rex Motor Car Mfg. Co., New Orleans, La., is planning for the construction of a new plant for the manufacture of pleasure cars. It recently increased its capital from \$250,000 to \$1,000,000. Robert Booth is president.

The Ignition Plug Co., Louisville, Ky., manufacturer of spark plugs, etc., has increased its capital from \$50,000 to \$100,000.

W. H. Rucker, Itta Bena, Miss., will install gravel recovery machinery at Columbus, Miss., including steam shovels, locomotive, etc.

The Saint Louis Machine Tool Co., 932 Loughborough Avenue, St. Louis, is building an addition to its plant, which will about double its capacity, giving 13,000 sq. ft. additional floor space. This enlargement was made necessary by its increasing business in grinding, polishing and tapping machines.

Indianapolis

INDIANAPOLIS, Dec. 22.

The Standard Wheel Works, Terre Haute, Ind., has been reorganized as the Standard Wheel Co. with \$600,000 capital stock. The officers are: President, Carl D. Fischer; vice-president, Emil Fischer; secretary-treasurer, Walter C. Clark. Other directors are Gavin L. Payne, vice-president Fletcher-American Trust Co., Indianapolis, and Theodore Stempfel, vice-president of the Fletcher-American National Bank.

The contract for the General Electric Co.'s new factory at Decatur, Ind., has been let to the Ferguson Construction Co., Cleveland. It will be 260 x 360 ft., and is to be completed in 60 days. Another building of the same size may be erected.

Sheller & Co., Portland, Ind., manufacturers of steering wheel rims, have let the contract for an addition to cost \$25,000. It will have 16,000 ft. of floor space and the force will be increased to 300.

The Pittsburgh Plate Glass Co., Pittsburgh, will build a power plant at Kokomo, Ind., to cost \$800,000.

The Instant Starter Co., Terre Haute, Ind., has been incorporated with \$25,000 capital stock to manufacture automobile starters and other devices. The directors are Raymond W. Nichols, March W. Haynes and Charles C. Kerlin.

The Multi-X-Aircraft & Motors Co., incorporated under the laws of Delaware, with \$3,000,000 capital stock, has

established headquarters at 112 East Market Street, Indianapolis, and announces that it will manufacture two types of airplanes as soon as suitable sites can be obtained for factory buildings. Dan B. Jesse is manager of the financial department.

The Muncie Malleable Foundry Co., Muncie, Ind., the new \$1,000,000 corporation which bought the plant of the Whiteley Malleable Castings Co., has elected the following officers: President, J. N. Klock, Benton Harbor, Mich.; vice-presidents, Governor William Sleeper of Michigan; J. Lloyd Kimbrough, Muncie; secretary, F. E. Crawford, Benton Harbor; treasurer, H. C. Udell, Benton Harbor; general manager, A. L. Minoski, Muncie; superintendent, W. E. Robinson, Muncie.

The factory of the Barber Mfg. Co., Anderson, Ind., was destroyed by fire Dec. 16 with an estimated loss of \$75,000. It manufactured automobile and bed springs.

The Cole Motor Car Co., Indianapolis, is erecting a five-story concrete building, 175 x 223 ft., on the corner of Market and Davidson streets and the Big Four tracks, at an estimated cost of \$350,000. It is planned to build in the spring a four-story and basement concrete structure, 100 x 225 ft., with L 35 x 50 ft., at the corner of East Washington and Davidson streets, at a cost of about \$300,000.

The Faultless Caster Co., Garvin and Eichel avenues, Evansville, Ind., is erecting a one-story addition, 65 x 135 ft., and will also build a one-story addition to its machine shop, 65 x 125 ft.

The Advance Stove Works, Evansville, Ind., is having plans prepared for additions to its plant.

The Jenkins Vulcan Spring Co., Washington Avenue, Richmond, Ind., manufacturer of automobile springs, is having plans prepared for the erection in the spring of a two-story addition, 75 x 400 ft., on North Eighth Street.

The William Small Co., 33 West Eleventh Street, Indianapolis, manufacturer of automobiles, is having plans prepared for a one-story plant, 70 x 480 ft., at Fifteenth and Belmont streets. William Small is president.

The Dean Brothers Steam Pump Works, 323 West Tenth Street, Indianapolis, is having plans drawn for a two-story machine shop, 27 x 120 ft., to cost about \$20,000.

Cleveland

CLEVELAND, Dec. 22.

Machine-tool dealers report a good business, and a heavy volume of inquiry. Orders include 14 lathes from a Detroit automobile company, but most of the business is in single machines in lots of two or three. Several new inquiries are for lots up to a dozen, with many from companies that want to place orders at once, but much of the prospective business will not be closed until after the holidays. Activity is confined largely to the automobile and rubber-tire industry. It is stated that approximately \$100,000 worth of equipment will be required for the new plant to be built in Cleveland by the Eaton Axle Co. for the manufacture of automobile axles.

The Ohio Blower & Body Co., Cleveland, has placed a contract for the construction of two reinforced concrete buildings, each five stories, 60 x 300 ft., and a one-story building, 100 x 250 ft. They will be used to increase the capacity for the manufacture of automobile bodies.

The Enamel Products Co., Cleveland, plans the erection of a one-story addition, 60 x 100 ft.

The Rubay Co., Cleveland, manufacturer of automobile bodies, will erect a one-story addition, 88 x 216 ft.

The Bridgewater Machine Co., Akron, Ohio, has acquired a site in Cuyahoga Falls on which it contemplates the erection of a new plant, largely increasing its present capacity. H. H. Bridgewater is president.

The American Stove Co., Cleveland, will erect a three-story addition, 60 x 152 ft.

The Eaton Axle Co., Cleveland, has been organized by J. O. Eaton, formerly president Torbensen Axle Co., Cleveland, and others, and will build a one-story plant, with a floor space of approximately 150,000 sq. ft., for the manufacture of automobile axles. It will be erected on a 15-acre site at the New York Central Railroad and East 140th Street. The company has been incorporated with a capital stock of \$5,000,000.

A plant for the manufacture of automobile forgings is being established in Cleveland by the Buckeye Forging Co., which has been recently incorporated with a capital stock of \$50,000, and has acquired a site on Harvard Avenue. D. Copeland, Frank R. Merchant and others are the incorporators.

The Toledo Steel Products Co., formerly the Lewis Steel

Products Co., will move about Jan. 1 from its present location on Detroit Avenue to its new plant on Summit Street.

The Toledo Enameled Wire Products Co. has been reorganized and its capital stock increased from \$15,000 to \$300,000, and will engage in the insulating of wire with enamel. The company established a plant a short time ago on Carroll Place and until recently has been engaged largely in experimental work. Jerome Ackerman is president; Harry Hirsch, vice-president, and Seymour Hirsch, secretary and treasurer.

The Arctic Ice Machine Co., Canton, Ohio, will erect a machine shop and power house. It is in the market for steam power plant equipment and expects to buy additional machine-tools.

The Knox Tire & Rubber Co., Mount Vernon, Ohio, has placed contract with the Elford Construction & Engineering Co., Columbus, Ohio, for a three-story brick and reinforced concrete plant, 100 x 225 ft.

The Plymouth Stamp Metal Co., Plymouth, Ohio, will move its plant to Gallon, Ohio, where a factory has been acquired. It manufactures stamped metal products.

The Ohio Steel Products Co., Mineral Ridge, Ohio, is enlarging its plant by the erection of two buildings, 60 x 400 ft., and 70 x 280 ft., respectively.

The Ashland Tire & Rubber Co., Ashland, Ohio, has placed a contract with the Hicks Construction Co., Springfield, Ohio, for a new plant for the manufacture of tires.

Pittsburgh

PITTSBURGH, Dec. 22.

The Carnegie Steel Co., Pittsburgh, has commenced the construction of new machine shops at its Edgar Thomson Works, Braddock, Pa.

The Interstate Steel & Iron Co., Pittsburgh, has been incorporated with a capital stock of \$25,000 by James Timms, 615 Kirtland Street; David Caplan and Max Jaffe, 914 Jancey Street, to manufacture iron and steel products.

The Oldsmobile Co. of Pittsburgh has filed plans for a one-story brick and concrete automobile service and works building on Center Avenue, near Negley Street, to cost \$29,000.

The McClintic-Marshall Construction Co., Pittsburgh, continues to add to its realty holdings in the vicinity of its works at Fair Oaks Station, and has purchased about 15 acres. The site adjoins its other property and the holdings of the American Bridge Co., between Leetsdale and Ambridge.

J. S. D. Morgan, 525 Homeward Avenue, Pittsburgh, will build a one-story plant, 50 x 100 ft., on Tioga Street, for the manufacture of sheet-metal products.

The Penn Public Service Co., Pittsburgh, has arranged for a bond issue of \$4,000,000, to be used in part for extensions and improvements in its power plant and system.

The Pittsburgh Knife & Forge Co., Ridge Avenue and Chateau Street, Pittsburgh, has awarded a contract to the Memphis Steel Construction Co., Magee Building, Pittsburgh, for a one-story plant at Coraopolis, 60 x 450 ft., to cost about \$500,000.

The Charleston Industrial Corporation, Charleston, W. Va., has acquired the Government explosive works at Nitro, W. Va., recently offered for sale, for a consideration of \$8,551,000. The plant was constructed at a cost said to be \$75,000,000 by the War Department.

The United States Window Glass Co., Morgantown, W. Va., is arranging for rebuilding its local plant, destroyed by fire Nov. 30, with loss estimated at \$200,000.

The Wheeling Corrugating Co., Sixteenth Street, Wheeling, W. Va., subsidiary of the Whitaker-Glessner Co., has acquired the plant of the Wheeling Ceiling & Roofing Co., at Warwood, and is said to be planning to convert it into a machine shop.

The Virginian Rubber Co., Odd Fellows Building, Charleston, W. Va., is planning for a new two-story plant, 100 x 260 ft., of brick and concrete, for the manufacture of cord tires, etc. The initial works will have a capacity of about 500 tires and 1000 tubes per day, and is estimated to cost \$200,000, of which over \$100,000 will be used for equipment. A. A. Lilly is president.

Texas

AUSTIN, Dec. 22.

The Central Texas Electric Co., Waco, which plans to construct an interurban electric railroad between Belton and Austin, about 50 miles, and between Waco and Temple, a distance of 60 miles, has appointed B. A. McCarthy, of the Central Texas Engineering & Construction Co., chief engineer. The project involves the construction of a large

electric power station, which will probably be located at Austin.

The Texas Independent Pipe Line Co., Laredo, has begun the construction of a 3000-bbl. oil refinery to cost about \$300,000.

The Texas Oil Products Co., Waxahachie, has awarded the contract for the construction of a 3000-bbl. refinery at that place to the Bootah Engineering Corporation, Detroit. It is stated that the capacity of the plant will be brought up to a minimum of 50,000 bbl. per day as rapidly as the business expands. G. Carl Fisher, Chicago, is president; Robert J. Fisher, Fort Wayne, Ind., vice-president, and Claude G. Fraser, Detroit, secretary-treasurer.

The Goose Creek Light & Power Co., Goose Creek, has been incorporated with a capital stock of \$75,000 and will construct an electric light and power plant. The incorporators are W. W. Sloan, R. S. Sterling and T. D. Joiner, Jr.

The Washington Iron Works, East Lamar Street, Sherman, Tex., is planning for the construction of a new machine shop.

The Hayden Spring Wheel Co., Dallas, has been incorporated with a capital of \$400,000 by R. E. L. Sanef, R. B. Stitcher, and B. Cornelison, to manufacture special metal wheels for automobiles.

Hyett & Croft, Mineral Wells, Tex., are planning for the erection of a two-story machine works and automobile service plant, 100 x 200 ft., to cost about \$25,000.

The Texas Eagle Producing & Refining Co., Main Street, Fort Worth, will build a new refinery with capacity of about 10,000 bbl. Frederick Cook is president and E. E. Peacock managing director of refineries.

The Stroud Mfg. Co., San José, Tex., manufacturer of automobiles, has arranged for the erection of a new plant to cost about \$550,000, including equipment.

The Howard Tool Works, Eastland, Tex., has been incorporated with a capital of \$50,000 by D. M. Howard, P. S. Wolfe and H. L. Durlin, to manufacture tools and machine parts.

The Ballard-Martin Electric Co., Fort Worth, has completed plans for the erection of a new plant for the manufacture of electrical equipment to cost about \$100,000.

The Pacific Northwest

SAN FRANCISCO, Dec. 16.

The Sumas Farm Implement Co., Sumas, Wash., will establish a plant for the manufacture of farm implements. W. V. Vanette is manager.

The Pacific Box Co., Tacoma, has increased its capitalization from \$200,000 to \$300,000, the additional funds to be used for extensions and improvements. C. A. Prass is secretary-treasurer.

The B. C. Fir & Cedar Lumber Co., Ltd., Vancouver, B. C., plans the erection of a new band mill, with a daily capacity of 80,000 ft. W. S. Burley is president.

The North Portland Box Co., Portland, Ore., whose plant was recently destroyed by fire with loss of \$25,000, will rebuild immediately for larger capacity. The machinery will be electrically operated.

The American Foundry Co., Seattle, will construct an addition to its plant, 30 x 150 ft., at a cost of \$5,000. New equipment will be installed.

J. W. and P. L. Newton, Roundup, Mont., will erect a new ice manufacturing plant, to cost about \$15,000 and to have a daily capacity of 15 tons. It will be electrically operated.

The Reliable Iron & Wire Works, Seattle, recently opened quarters at 579 Railroad Avenue, where a general sheet metal works and manufacturing plant will be conducted. Fred Herz is president.

The Associated Lumber & Box Co., Klamath Falls, Ore., will construct a planing mill and box factory at Dorris, to have an annual capacity of 25,000,000 ft.

Louis D. Stoff will build a machine shop on Folk and O'Farrell streets, San Francisco, at an estimated cost of \$10,000.

The Jewell Steel & Malleable Co., San Francisco, is calling for bids on a one-story concrete addition to its factory to cost about \$10,000.

The Woodward Way Mfg. Co., Sacramento, has been incorporated with a capital stock of \$100,000, to manufacture automobile appliances and parts, and immediately erect a building at a cost of \$20,000 and purchase machinery. H. A. Woodward, E. B. Rutherford and associates are the incorporators.

Contract has been let by the Best Steel Casting Co., Oakland, for a pattern shop to cost \$25,000 and a foundry to cost \$10,000.

Canada

TORONTO, Dec. 22.

The McClary Mfg. Co., Montreal, has secured property adjoining its plant and will start work immediately on the erection of a four-story addition. J. C. Newman is manager.

The Dominion Bridge Co., Montreal, is having plans prepared for the erection of a foundry at Lachine, Que., to be used in connection with its new manufacture of turbo machinery and paper mill equipment.

The Dominion Road Machinery Co., Goderich, Ont., will build an addition to its plant to cost \$25,000.

Douglas Bremner Co., 10 Cathcart Street, Montreal, has the general contract for the erection of a factory at Brownsburg, Que., to cost \$50,000, for the Dominion Cartridge Co., 120 St. James Street, Montreal.

The Frid Construction Co., Clyde Building, Hamilton, Ont., has been awarded the general contract for the erection of a factory in Hamilton for the Norton Co., Worcester, Mass., to cost \$75,000.

The W. H. Yates Construction Co., 17 Main Street East, Hamilton, Ont., has been awarded the general contract for the erection of a manufacturing building for the B. Greening Wire Co., 55 Queen Street, North, Hamilton. B. H. Prack, 50 Bay Street, Toronto, is the engineer and architect.

The Wayagamack Pulp & Paper Co., Three Rivers, Que., will build an addition to its mill to cost \$3,000,000. Frank I. Ritchie is manager.

J. B. Nicholson, Ltd., Hamilton, Ont., is moving its head office to the Excelsior Life Building, Toronto, and will also establish a plant in that city. It specializes in the design and construction of circular reinforced concrete bins for coal, grain and oil storage. It will retain an office and plant at Hamilton.

The Jansen Mfg. Co., Detroit, Mich., has taken over the Dale Machine shop at Walkerville, Ont., and will manufacture binding grips for auto upholstery.

The Federal Cement Co., Owen Sound, Ont., will make improvements in its plants and install machinery for a daily capacity of 2000 bbl.

The Canadian Kron Scale Co., Montreal, will establish a plant there for the manufacture of automatic industrial scales and Stuebing lift trucks. Arrangements and plans have not yet been completed.

The Buhl Stamping Co., Detroit, Mich., has secured the premises of the Hiram Walker cooperage mill, on Walker Road, Walkerville, Ont., where it will manufacture its line for the Canadian market.

The Scientific Experimenter, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Colville Sinclair, Shirley G. Dixon, Ralph E. Allan and others to manufacture wireless telegraph instruments, signals, appliances, machinery, electrical goods, etc.

The Dominion Engineering & Machinery Co., Ltd., Montreal, has been incorporated with a capital stock of \$3,000,000 by Linton H. Ballantyne, Francis G. Bush, George R. Drennan and others to manufacture machinery, castings, power and hydraulic equipment, etc.

Circular No. 80, of the Bureau of Standards entitled "Protective Metallic Coatings for the Rust-Proofing of Iron and Steel," discusses the various classes of protective metallic coatings (including oxide and similar coatings) as to production, structure, and methods of testing. In general, when protection rather than finish is desired, zinc should always be depended upon. The advantages of the various types of zinc coatings for particular purposes are pointed out. No general rule can be laid down for the testing of coatings; each type must be considered by itself. The salt spray test, while being far from entirely satisfactory, approximates service conditions quite closely and is preferable to the other methods of testing which have been proposed and used.

F. G. Coburn, Boston, has been awarded a contract to construct a paint house and storehouse for the Government Arsenal at Watertown. A storehouse is badly needed there, inasmuch as several hundred thousands of dollars worth of machine tools and other machinery, a large portion equipped with motors, is exposed to the weather. Many of the machine tools have deteriorated to a degree that it is possible they cannot be consigned to anything but the scrap heap.

OFFICE CHANGES

The general offices of all the Hillman interests at Pittsburgh are now located on the 20th and 21st floors of the First National Bank Building in that city. The Hillman interest now own and operate the companies named below as follows: J. H. Hillman & Sons Co., Hillman Coal & Coke Co., Hecla Coal & Coke Co., Thompson Connellsville Coke Co., Clarksville Gas Coal Co., Luzerne Coal & Coke Co., Belle Vernon Coke Co., West Penn Coke Co., Hillman Transportation Co. and Dravosburg Dock & Construction Co. For the present the offices of the Diamond Coal & Coke Co. will remain in the House Building and the Unity Supply Co. in the Oliver Building, Pittsburgh, these being also Hillman interests.

M. L. Goldberg & Son, 1302 West Washington Street, Indianapolis, Ind., dealers in iron and steel scrap, second-hand electric machinery and dismantlers of obsolete plants, who were formerly located at Princeton, Ind., have completed their new scrap iron yard with a siding for 10 cars.

The Fulton Foundry & Machine Co., 1209 Marquette Road, Cleveland, has removed to 7500 Morgan Avenue in that city.

The Gandy Belting Co., Baltimore, Md., has opened a Chicago branch at 549 Washington Street. The Chicago branch will handle all orders from that district. Fielder I. Schillenberg, Jr., formerly of the New York office, is in charge.

The Findlay Engineering & Mfg. Co., Findlay, Ohio, organized on May 12, this year, has made a specialty of building automobile, truck and tractor parts for manufacturers, and has enjoyed such a large amount of business that it has become necessary to acquire more floor space to take care of its work. The company has just purchased the property and buildings of the Findlay Iron & Coal Co. at Findlay. It is erecting a gray iron foundry, will specialize in making light gray iron castings for the trade, and is also installing a large amount of additional equipment to take care of its increased business. It will be in its new quarters in 30 days, and will have a plant containing 25,000 ft. of floor space, equipped and devoted exclusively to parts manufacturing and contract work.

The Wellman-Seaver-Morgan Co., Cleveland, has taken a contract from the Western Maryland Railway Co. for the erection of the new car dumper at Baltimore, Md. This will be a direct loading and direct lifting dumper with a capacity of 40 100-ton cars per hour and it is stated that it will be the first dumper to be built that is fully electrically equipped. The dumper will be designed to turn a car over at 83 ft. above water or 10 ft. higher than any dumper previously built. It will be equipped with mule haulage. In addition to the dumper an electrically operated moving device will be provided for moving a vessel along the dock at the side of the dumper.

The Automotive Products Corporation, New York, has been appointed foreign sales agent for the products of the Standard Roller Bearing Co., Philadelphia, manufacturer of roller and ball bearings, and the New Jersey Car Spring & Rubber Co., Jersey City, N. J., maker of automobile tires and inner tubes. The Automotive Products Corporation gives special attention to metric sizes in automobile equipment, which is in demand in the foreign markets.

Fred R. Kanengeiser, general manager, announces that foundations are being installed at Bessemer, Pa., for the new cement plant of the Bessemer Limestone & Cement Co., Youngstown, Ohio, to cost \$1,000,000. Contracts for equipment have been awarded the Allis-Chalmers Co., Milwaukee, Wis., whose engineers designed the plant. It will have a capacity of 3000 bbl. of cement daily. Awards for buildings will be let.

The Truth About the Rock Island Plan

(Continued from page 1329)

Arsenal Orders Committee,
Production Committee,
Employment Committee,
Rates of Pay Committee,
Promotions and Discharge Committee,
Working Conditions Committee,
Recreation Committee,
Shop Discipline Committee,
Safety and Sanitation Committee,
Instruction Committee,
Inventions Committee,
Statistics Committee.

It will be noted that there is a committee to consider rates of pay and this brings to mind the rumor that the Rock Island employees had fixed 4000 new piece work rates. This report is entirely without foundation. As previously outlined, the employees may recommend changes in their wages, but their recommendations are by no means the equivalent to adoption.

Do Not Elect Own Foremen

Another newspaper report was to the effect that the Rock Island employees elect their own foremen. This is also untrue. If the men are dissatisfied with a foreman, they are privileged, under the central council plan, to bring the matter to the attention of the management through the proper industrial departmental committee or the standing committee on shop discipline. The advantage of providing machinery for the filing of complaints of this character is that it insures the higher executives of the arsenal more complete information regarding the conduct of their subordinate officials than was possible under former conditions when workers hesitated to bring such grievances to the attention of the management for fear of being misunderstood and subsequently discharged or subjected to the petty tyranny of the foreman criticized.

Council Did Note Vote Short Hours

The press report to the effect that the Rock Island employees have voted themselves a 44-hr. week and an annual vacation of one month is also in error. They are entitled to 30 days' leave of absence with pay under the provisions of existing statute law; executive orders of long standing have decreed that eight hours constitutes a day's work at practically all Government establishments in peace time, and also that for 13 Saturdays in the summer four hours constitutes a day's work. Neither the workers themselves nor the management represented by the Arsenal Commander, the Chief of Ordnance, or the Secretary of War himself have any powers to set aside or to extend these provisions of law or executive order.

The Solicitation of Business for the Arsenal

It has been charged that the Arsenal Orders Committee is being utilized to secure business for the arsenal in competition with private manufacturing plants to the injury of the latter. The arsenal, which is supported by taxes, coming in part from private industries, has no capital upon which it must earn a profit. It is decidedly unfair, according to the press statements to force private companies to contribute to the support of a Government institution and thereby make it that much more difficult to meet the latter in open competition. The allegation regarding the solicitation of business by the arsenal is true insofar as government needs are concerned. It is felt by both the management and the employees that a fair sized working force should be maintained in peace times so that the transition from a peace to a war basis of operation can be made with a minimum of lost motion. Their experience in connection with the late war was a convincing lesson in the value of preparedness, some parts of the arsenal not having reached the point of reasonable operating efficiency until shortly before the armistice.

During the war the arsenal had as many as 14,000 and 15,000 employees; the present working force is about 7000. It is the hope of the management and workers to render more gradual the further reduction in working force which will naturally follow from the great reduction in appropriations for the manufacture of ordnance, by soliciting orders from

other Government departments. The arsenal, be it understood, is not venturing into the field of private business, but is merely trying to keep informed as to needs of the various Government departments so that it can bid on work it is equipped to handle.

Positive Results Achieved by Council

Attention having been directed to what the council has not done, the question arises, what positive results has it achieved. In this connection it should be pointed out that the arsenal organization is still young and both officers and employees have been largely occupied in familiarizing themselves with the operation and scope of the plan. Whatever may have been the hopes or purposes of the employees when they first embraced the council scheme, their assumption of responsibility has tended to make them conservative. They do not expect to attain any of the illusory panaceas of radical agitators, but rather to co-operate earnestly with the management in the interest of all concerned. The council serves as a barometer of the morale of the employees. In the event of any complaints by employees, every effort will be made to examine into their justification and to take appropriate action to remove the causes thereof.

Thus far the positive achievements of the council plan include the amicable adjustment of several minor differences with the management, and the provision of new entertainment features for the benefit of all employed in the arsenal. Among the latter is an employees' band, which plays on the campus of the arsenal during lunch hours when the weather permits. The council also arranged the first dance ever held on the arsenal grounds.

Council Plan Introduced Last Summer

To inaugurate the plan, the first elections were held last summer under the direction of a temporary central council appointed by the management. This body selected two representatives in each department, who, with the departmental timekeepers, acted as judges of election. At subsequent elections the Central Council will appoint the election judges to act with the timekeepers. Election is by secret ballot and, upon request, ballot boxes and blank ballots are provided by the management. Notice of elections must be distributed or posted at least one full week prior to voting.

No employee less than 18 years of age nor with less than six months service in the arsenal is entitled to vote. The judges of election are charged with preparing and posting in each department in a conspicuous place a list of workers eligible to vote.

The election ballots are counted by the department judges of election, and lists in triplicate showing the number of votes cast for each person are prepared by them and signed by each judge,—one of which is posted in a conspicuous place in the department, one forwarded to the commanding officer and one sent to the Central Council. The three persons receiving the highest votes in each department are the representatives of that division for the ensuing year, or until their successors are elected.

The election judges are required to seal and hold in safe custody for a period of 10 days the ballot boxes containing the election ballots. In case of an appeal signed by not less than two-thirds of the voters of any department within the 10 day period, questioning the validity of the count, the judges will deliver the sealed ballot boxes to the Joint Conference Committee, by which a recount will be made from which no further appeal can be taken. If in the judgment of the conference committee the irregularities are such as to demand a new election, it is authorized to arrange for a second vote.

As time is required to gain sufficient knowledge of the conditions of work in a department to insure intelligent representation of the employees, all persons elected as representatives must have a record of at least one year's employment at the arsenal.

There is provision in the council plan for both the recall and the referendum. If the services of any representative become unsatisfactory to the department by which he was elected, he may be recalled as follows:

A petition of recall signed by not less than one-third of the employees of the department shall be filed with the central council. Under the direction of the council there shall then be held a special election in the department to decide whether the representative in question shall be recalled or continue in office. A decision either way becomes effective through a majority vote. As team work is the only guarantee of a successful works' organization and may be impeded through the activities of individuals temperamentally inclined to obstruct necessary business, the recall may be initiated by either the management or the central council. The request will be presented to the Joint Conference Committee in writing, giving full and specific charges. When the evidence warrants, appointed representatives shall be removed and elected representatives recalled by referendum.

If any department representative leaves the service of the arsenal or is recalled, or is absent from more than three consecutive meetings of the committee upon which he serves without securing an excuse from the joint conference committee for such an absence, his membership in the central council shall immediately cease. Vacancies so created will be filled at once by special elections conducted in the same manner as regular elections.

Questions may arise in the joint conference committee on which it may seem desirable to have an expression of opinion of the department directly affected or the employees as a whole. In such cases a request for referendum may originate either with the management or the council or the constituencies. When the request has been presented in writing to the central council, it will refer the question, as formulated by the joint conference committee, to the department or departments interested.

Complete Gas Combustion a Boiler Fuel Saver

WASHINGTON, Dec. 22.—Interesting data concerning boiler efficiency has been secured by the Bureau of Mines, in conjunction with the Emergency Fleet Corporation, as the result of tests and temperature measurements of gases in the setting of a boiler which has been under test by the corporation at Erie, Pa. O. P. Hood was in charge.

The results obtained, according to the report, clearly indicated that sufficient air cannot be admitted through the fuel bed of a hand-fired furnace to provide for complete combustion, 20 to 32 per cent of combustible gases always escaping with no free oxygen to burn it. This fact is independent of the kind of fuel or the rate at which air passes through it. While in ordinary furnace practice there are so many holes in the fuel bed and so many leaks around furnace doors and in boiler setting that an excess of air commonly exists in the flue gases, this condition does not usually bring about complete combustion, because the air is not properly mixed with the combustible gases, nor is it under control as to quantity. In other words, for proper combustion, excess air should be introduced above the bed in such a way to bring about a complete combustion of the gases. Another point revealed was that the baffles should be designed from exact determinations, not as commonly done from empirical data.

As a result of the information obtained from temperature measurements and gas analyses, the design of the boiler was so modified that six tons of coal were enabled to do the work of seven.

A motor operated letter opening machine is being marketed by the Bircher Co., Rochester, N. Y. The machine occupies a small space and can be placed on a table or desk, and one operator can, it is stated, open 500 letters per minute. The current is taken from an ordinary lamp socket.

Stages in the construction of the large army supply base at Philadelphia are illustrated and the work is described in a bulletin "Development" Book 2, No. 2, published by the supervising engineers, Day & Zimmermann, Inc., 611 Chestnut Street, Philadelphia.

IRON ORE LANDS

Assessed Value in Minnesota Shows Decrease Compared With Last Year

The 1919 assessed value of all land in Minnesota containing merchantable iron ore is \$282,109,811 as compared to \$295,102,890 in 1918. The decrease is \$12,992,079.

Iron ore is assessed for taxation purposes at one-half of full value in accordance with the provisions of the classified assessment law. Other property is assessed at from 25 to 40 per cent of full value according to class.

In 1918 the number of tons of merchantable iron ore in the ground reported for taxation was 1,430,711,297, and the 1919 figures are 1,394,923,451, a decrease of 35,787,846 tons. This is the largest loss in tonnage reported for any year since 1907.

These figures were compiled and issued recently by the Minnesota Tax Commission which has just completed its work of equalizing mineral valuations. The decrease in merchantable tonnage reported, as well as in valuation, has been due to the fact that little exploring for new ore was done during the year ending May 1, last, the date of assessment. Only 7,900,000 tons of new ore were found during this period while the shipments from Minnesota aggregated 45,000,000 tons.

In addition to the merchantable tonnage measured by the tax commission, there are approximately 175,000,000 tons of iron ore of record in the tax commission's office, the grade and character of which are such that present market standards and conditions make it non-merchantable. At some future time, this ore may have a market value.

Iron ore in stock pile at the mines, that is mined iron ore, is assessed as personal property, also at 50 per cent of full value. The amount on hand May 1 varies considerably from year to year, due to shipping and market conditions. This year 4,912,403 tons of mined iron ore were reported and the assessed value is \$6,827,419. Last year 7,025,787 tons were reported and the assessment was \$8,237,586.

In 1906, the year before the tax commission was created, the total assessed value of all mineral properties was \$64,486,409. No tonnage records are available. The first assessment equalized by the tax commission in 1907 revealed 1,191,969,757 tons and the assessed value was placed at \$191,706,682. Since that date, approximately 420,000,000 tons of iron ore have been shipped from Minnesota. Despite this large depletion, the 1919 record of merchantable ore in the ground is 202,953,694 tons larger than that of 1907 and the assessed value is \$97,233,693 greater, due to the development of new ore bodies and increased tonnages discovered in mines already operating.

Natural Gas At Pittsburgh

A very large gas well has recently been drilled near McKeesport, Pa., the gage indicating a daily production from 7,000,000 to 10,000,000 cu. ft. of gas every 24 hrs. This is the third large gas well recently struck in this field, one of them causing considerable damage in the vicinity where it was struck, owing to the high pressure. The outlook is that the supply of natural gas in the Pittsburgh and nearby districts, for the coming winter will be larger than for some years.

Technologic Paper No. 121, of the U. S. Bureau of Standards entitled "Strength and Other Properties of Wire Rope," presents the results of tensile tests upon 275 wire rope specimens selected under the specifications of the Isthmian Canal Commission. The specimens ranged in diameter from ¼ in. to 3¼ in. and comprised five of the more common classes used in engineering practice. The laws of construction of the specimens were determined and were used as the basis of the analysis of their physical behaviors under stress. Numerous comparative physical and chemical tests were presented of the wires, fibers and lubricants used in wire rope construction.

Short Trade Items

Export orders for Japan and France for complete tinning machines, including tin pots, conveyors and branning and polishing units are being filled by the Aetna Foundry & Machine Co., Warren, Ohio. French and Japanese sheets makers are also in the market for galvanizing equipment. The company recently appointed an American engineer to represent it in France and Belgium, with headquarters in Paris. The company is preparing to build a galvanizing machine of a new type. Representatives of a British corporation about to erect a tinplate plant in Toronto, Can., have negotiated with Aetna company officials for their complete tinplate machinery.

The Truscon Steel Co. announces that ground has been broken for a building, 50 x 150 ft., at its Youngstown, Ohio, works. The company has a plant in course of construction in Japan and is considering erection of another at Singapore, Straits Settlements, Asia. This company is concentrating its energies to capture trade in the Far East.

The Youngstown Silica Sand & Sand Products Co. has been formed at Youngstown, Ohio, with a capital of \$200,000, all common stock, to develop leased holdings consisting of 114 acres four miles south of Mercer, Pa., tapped by the Pennsylvania railroad. Contour survey of the property is now being made and machinery for removing the deposits is being designed by R. C. Krause, in the engineering department of the Carnegie Steel Co., who is the Silica company's chief engineer. It is planned to install a plant with a capacity for handling 500 tons of silica sand daily and to have it in operation in time for the summer trade. The company's silica deposit is a soft rock formation over 90 ft. deep that covers 50 acres, with an exceptionally high percentage of silica. Directors are Ray T. Miller, G. E. Burke, Robert E. Holway, J. R. Riley and Francis M. Van Esbeck. The rest of the company's property contains rich deposits of molding and building sand.

The General Electric Co. has taken the property occupied by the munition works of the Mead-Morrison Co., Gloucester, Mass., and additional land adjacent, on which a large building will be erected. The plant is served by the Gloucester branch of the Boston & Maine Railroad, and has a considerable water frontage. The company also has bought the plant of the D. & W. Fuse Co., Providence, R. I., where small devices will be manufactured.

The Waldorf System has agreed to install and operate restaurants at the plants of the Acme Wire Co., New Haven, Conn., and the Carpenter Steel Co., Reading, Pa.

The blast furnace plant of the Wharton Steel Co., Wharton, N. J., is to be rebuilt by Arthur G. McKee & Co., Cleveland. The work will involve the remodeling and enlarging of the two existing furnace stacks and installing new equipment. The Weirton Steel Co., Weirton, W. Va., has arranged to equip its existing furnace with a McKee revolving stock distributor, making, it is stated, a total of 112 distributors of the McKee type operating or under construction.

The United Alloy Steel Corporation, Canton, Ohio, will erect a building which will be equipped for a restaurant and a store for its employees. The restaurant will be of sufficient capacity to serve meals for 3000 men.

The Walcott Lathe Co., Jackson, Mich., has opened display rooms at 1316 Ontario Street, Cleveland, under the direction of Frank H. Wheaton, and will keep on display a line of Walcott lathes and shapers, Jackson duplex die sinkers, and cherrying cutters.

The A. W. Kilbourne Co., a new \$1,000,000 corporation, will erect a brass and copper smelting and refining plant at Clinton Road and the Big Four Railroad, Cleveland. The building will be 150 x 300 ft., and the

plant will have a capacity of 60 tons a day. E. I. Heinsohn, president United Copper Products Corporation is president, Ralph H. Parish and Edward A. Noll, the latter president National Tool Co., are vice-presidents, Lloyd H. Pool secretary, and R. H. York treasurer.

Freyn, Brassert & Co., engineers, Chicago, have been retained by the Shelton Iron, Steel & Coal Co., Stoke-on-Trent, England, as consulting engineers in connection with blast furnace and rolling mill improvements.

The Milton Mfg. Co., Milton, Pa., manufacturer of nuts, bolts, etc., resumed operations at its bar and puddle mills, Dec. 5, after a shutdown, due to a strike, for the past 10 weeks.

Effective Dec. 10, the Bryden Horse Shoe Works, Catasauqua, Pa., closed three of its four mills due to bituminous coal shortage; No. 2 mill is being kept in operation under single shift and the hammer department with double shift.

Building operations at Gary, Ind., are the largest in Indiana. In eleven months 1144 permits have been issued for buildings to cost \$5,263,142, exclusive of \$10,000,000 for the new tin mills and \$300,000 for addition to the gas plant of the Gary Heat, Light & Water Co.

The G. M. C. Engineering Co., Worcester, with a capital of \$25,000, has been granted a Massachusetts charter to deal in blowers, stokers and power equipment. John L. Gallivan, Worcester, is president.

November sales of machines and chucks by the Heald Machine Co., Worcester, Mass., were larger than those for any previous month this year. Part of the shop is working overtime until 9 o'clock, and there has been an all-night force for several weeks.

The Gray Iron Foundry Co., Reading, Pa., has awarded a contract for the erection of a \$22,000 additional foundry building. A. L. Frame is president.

Consolidation of the Youngstown Furnace Co. at Youngstown, Ohio, with the Victor Stove Co., Salem, Ohio, will take place as result of the sale by A. K. Kimmel, president of the Youngstown company, of his interests to the Victor company. Mr. Kimmel will retire from the Youngstown Furnace Co. Jan. 1.

The West Virginia Manufacturers' Association, Wheeling, W. Va., will hold its annual meeting at that city Jan. 29-30. Plans are now being arranged for the event, including a program of prominent speakers on important subjects. Among those affiliated with the organization are the J. E. Moss Iron Works, LaBelle Iron Works, Whitaker-Glessner Co., Wheeling Stamping Co., Wheeling Bronze Casting Co., Wheeling Mold & Foundry Co., Merchant & Evans Co., and J. L. Stifel & Sons.

On Dec. 10 the Norma Co. of America, manufacturer of precision bearings, moved its factory from the Bronx, New York, to Anable Avenue, Long Island City, N. Y., where a modern four-story reinforced concrete building has been acquired, giving largely increased factory space.

With a November payroll in the Youngstown, Ohio, district of \$6,190,417, total distribution for 11 months in 1919, exceeds \$76,000,000. The November distribution compares with \$4,965,179 for October and \$7,792,350 for September.

"How Thermit Cured My Diseased Neck" is the subject of a folder being distributed by Metal & Thermit Corporation, 120 Broadway, New York. It shows how the worn parts on the end of a 16-in. diameter neck of a large roughing mill pinion used by the Universal Rolling Mill Co., Bridgeport, Pa., was built up with thermit steel.

Commercial explosives is the subject of bulletin No. 28 of "Safe Practices" issued by the National Safety Council, 168 North Michigan Avenue, Chicago. The pamphlet gives important federal and state regulations relative to the manufacture, transportation and use of explosives.

Production of bituminous coal in the second week of the strike was 33 per cent of normal, as compared

with 29.4 per cent for the first week. The output of the seven days was 3,990,000 net tons, according to the compilation of the United States Geological Survey, an increase of 438,000 tons over the preceding week.

"Reciprocating Engines and Turbines" is the subject of a series of articles appearing monthly in "The Travelers Standard" published by the engineering and inspection division of the Travelers Insurance Co. and the Travelers Indemnity Co., Hartford, Conn. Causes of accidents and preventive measures are discussed in detail.

A suggestion how manufacturers may get before their employees a concrete idea of what are the overhead charges against the products being manufactured was contained in an address presented before the Associated Business Papers, Inc., at a recent meeting in Chicago, by Charles Piez, president Link-Belt Co., Chicago. The address has been put into leaflet form and it is possible that a copy may be had by addressing the Link-Belt Co., 910 South Michigan Avenue, Chicago.

A new storage battery jar is announced by the Electric Storage Battery Co., Philadelphia. The manufacturer states that tests have shown these jars to stand a pressure of 2000 lb. at their weakest point, whereas the old type jar broke at less than 1000 lb. This increased strength is emphasized as making the jar particularly desirable for batteries in mine locomotives, industrial trucks and tractors.

By substituting oil for coal the plant of the Steel Forge Co. at Ellwood City, Pa., continued in operation during the coal shortage.

A monograph on "Advertising American Goods in Japan" has been issued by the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington. It amounts to a mimeographed article by Alfonso Johnson, business manager of the Japan Advertiser, covering conditions of advertising and putting forth an argument why it is desirable. Included is a list of magazines by classes and information as to advertising rates. It is probable that a copy of the monograph may be obtained by applying to the bureau, asking for the article by title and number, which is FE-51.

"Manufacture and Testing of Large Chains for the Fenders in the Panama Canal Locks" was discussed by Henry Goldmark, consulting engineer, New York, and late designing engineer, Isthmian Canal Commission, in a paper presented before the Western Society of Engineers, Chicago. A description of the chains, methods and results of testing and specifications were given. A copy of the paper can doubtless be secured by addressing Edgar S. Nethercut, secretary of the society, 1735 Monadnock Block, Chicago.

Pulverized coal systems are to be installed at the Marion Malleable Iron Works, Marion, Ind., the Grand Rapids Malleable Iron Works, Grand Rapids, Mich., and the Franklin Steel Works, Franklin, Pa., the last covering 1700 hp. in boilers, by the Bonnot Co., Canton, Ohio, according to information received from C. F. Herington, district manager of the company in Chicago.

The receivership of the Groton Iron Works, New London, Conn., has been continued six months dating from Dec. 7. Authority has been granted by the court for the payment of \$43,312.30 in bonuses to forty-nine workmen employed by the corporation. The company employs 2600 men and has three ships on its ways.

A new publication of the Bureau of Standards, Technologic Paper No. 137, entitled "The Coking of Illinois Coal in Koppers-Type Ovens," gives the results of some of the tests that demonstrated that some Illinois coals can be coked in the Koppers type oven without radical change in operating methods for producing coke for use in blast furnaces. The yield of gas and by-products from the Illinois coal is proved excellent both in quantity and quality. The Bureau of Mines was responsible for the sampling and weighing, including the handling of the coke, analyses of coal, etc. The subject of costs was not discussed in the report, since this depends upon local conditions.

"Trucks and Wheelbarrows" is the subject of No. 30

of "Safe Practices" issued by the National Safety Council, 168 North Michigan Avenue, Chicago. It illustrates and describes devices for the handling of bulk material such as sand, ore, coal, lumber, castings, finished and unfinished parts.

A towing chain for the auto owner is being marketed by the Chain Products Co., Cleveland. The links are made of 5/16 in. stock and are hot galvanized. The chain is 18 ft. long, has a forged hook at each end, and the ends are covered to protect the finish of the car.

The Malleable Steel Range Mfg. Co., South Bend, Ind., has almost completed a furnace and other equipment for the manufacture of the Bower-Barff rust resisting treatment used on its polished malleable range tops. With the completion of this plant the company will be in a position to furnish this protective finish to outside manufacturers. The department will be under the supervision of William R. Swan.

The Union Switch & Signal Co., Swissvale, Pa., has recently issued a new bulletin on drop forgings containing illustrated descriptions of many new parts added to its range of product, more particularly in heavy forgings for trucks such as axles, spindles, knuckles, brake bands, etc. It has installed six additional steam hammers up to 6000 lb. in the last six months and now has a capacity of 1500 tons of forgings per month. It has also equipped for completely machining crank shafts ready for assembly.

The Worcester Machine Works, Inc., Worcester, Mass., is making plans for the building of new shops to contain some 60,000 sq. ft. of floor space. The company builds internal grinding machines, the demand for which is so great that order books are filled for months ahead. The present 12,000 sq. ft. of manufacturing space is wholly inadequate. Ralph L. Morgan is the president of the company, L. M. Crittisinger, manager and treasurer, and Edwin Churchill, chief engineer.

Sweden exported during last July 483,000 tons of iron ore, and during August 406,000 tons, as against a monthly average of about 151,700 tons in the first six months of the current year, and 693,000 tons in August, 1918. Her pig iron exports last July were 8856 tons, and 4682 tons last August, as compared with a monthly average of about 8000 tons during the first half of the current year, and 13,992 tons in August, 1918. Her exports of other descriptions of iron and steel were 12,377 tons in July, and 11,376 tons in August last, as compared with a monthly average of about 12,000 tons during the first six months this year, and 16,150 tons in August, 1918.

Concrete shipbuilding has been practically abandoned in the United Kingdom, according to a cablegram received by the United States Shipping Board from the American Embassy at London.

An air-operated chuck known as Lavoie and which embodies all the component parts in one unit is being manufactured by the Frontier Chuck & Tool Co., 30 Letchworth Street, Buffalo. A lever and wedge, which control the action of the jaw, are emphasized as original with this chuck and as making for positive clamping, long life and simplicity.

A tool for reboring and burnishing the cylinders of Fordson tractor engines and Ford model T engines is announced by the Michigan Machine Co., Detroit.

Adjustable shell reamers, taps and high speed and carbon steel have been added to its line by the Maddaus Tool Corporation, 90 West Street, New York.

The Nova Scotia Steel & Coal Co. has just bought large timber tracts at Sunny Brae, Pictou County.

The Osaka Steel Works have lately bought a good deal of steel scrap in the United States, says the London *Ironmonger*. The new Yawata steel plant is ready to operate. The equipment will include a tin-plate mill with capacity large enough to supply the greater part of the Japanese demand. The works are manned with a Japanese technical staff and operatives, the Germans employed in their construction having been dismissed.

NEW TRADE PUBLICATIONS

Open-Hearth Furnace.—McLain-Carter Furnace Co., Milwaukee. Catalog, 17 pages, 9 x 12 in. Illustrates and describes a stationary open-hearth furnace designed for both acid and basic melting. The complete unit consists of a hearth, uptake flues, checker chambers, reversing valve, stack and charging floor. Views show installations of furnaces in customers' plants. Furnace production figures and analyses of heats run are included.

Photographic Lenses.—Bausch & Lomb Optical Co., Rochester. Catalog with the title "What Lens Shall I Buy?" Explains the adaptability of the company's line of lenses for various classes of photographic work. Reproductions of photographs indicative of the capabilities of the lenses are included.

Machine Tools and Shop Accessories.—Alfred Herbert, Ltd., Dey Street, New York. Bulletin 101. Introduces a line of special machine tools and accessories made in Coventry, England. The machines illustrated and described include a combination turret lathe, hexagon turret lathe for bar work, No. 4 universal turret lathe, Lumsden oscillating tool grinder, Gardner crank pin turning machine, Hilo-plane or Lancashire-Stirk planer, Muir puncher slotting machine, Webster and Bennett profiling and cam milling machines, Coventry concentric chuck, Coventry self-opening die head and die grinding fixture. A list of brands of high-speed tool steel made by Moses Eadon & Sons, Sheffield, and a line of high-speed twist drills and milling cutters made by E. G. Wrigley & Co., Ltd., England, are included.

Screens, Elevators and Conveyors.—George Haiss Mfg. Co., Inc., 141st Street, New York. Booklet 619. Devoted to coal, stone and sand elevators, conveyors, screens and gates. The devices illustrated and described include revolving screens, screen chutes and gates, portable belt conveyor, car unloader, semi-portable loading bin, crushed stone elevator, centrifugal discharge elevator, hanging elevator, take-up boxes and elevator boots.

Dock Cranes.—Wellman-Seaver-Morgan Co., Cleveland. Bulletin 38, 16 pages, 8½ x 11 in. Illustrates and describes the company's dock cranes, and shows how the cargoes are mechanically handled by these cranes at the U. S. Army Supply Base, Boston.

Milling Machines.—Ingersoll Milling Machine Co., Rockford, Ill. Folder. Shows how the six surfaces of block castings for Knight motors are milled in one pass at the plant of the Willys Overland Co., on an Ingersoll fixed rail milling machine.

Line Shaft Couplings.—Smith & Serrell, 90 West Street, New York. Bulletin 103. Describes and shows how to apply a rigid coupling on line shafting. The coupling consists of a cast-iron sleeve with holes drilled in it and fitted with a set of hardened steel cup-ended pins which are driven home with a hammer, cutting their own seats in the ends of the shafts.

Semi-Trailer Coupling.—J. Bryant Olds Co., Inc., Maspeth, N. Y. Folder. Describes a semi-trailer coupling and automatic support by means of which the trailer couples to the truck body without its being necessary to jack up the body.

Shop Construction.—Westinghouse, Church, Kerr & Co., Inc., 37 Wall Street, New York. Folder. Lists a number of firms for whom the company has designed and built shops and shows views of a number of the shops constructed.

Cement and Glass Tile Roofs.—Federal Cement Tile Co., 110 South Dearborn Street, Chicago. Folder with the title "Capitalize the Sunlight." Shows an installation and explains the advantages of roofs made with the company's cement tile and glass tile.

Heat Insulations.—Franklin Mfg. Co., Franklin, Pa. Catalog F. C. 7-19, 77 pages, 7¼ x 11 in. Describes heat insulations including 85 per cent magnesia, asbestos, wool felt and vitrified products. Packing and shipping data, engineering information, numerous tables and data, instructions for the use of the product and concrete examples are included.

Production and Inspection Tools.—Taft-Peirce Mfg. Co., Woonsocket, R. I. Bulletin 110, 23 pages, 8 x 10½ in. Devoted to production and inspection tools including taper test gages, sine bar, sine-bar fixture, V blocks, equalizing jaws, steel parallels, box parallels, toolmaker's adjustable knee, toolmaker's knee, slotted angle irons, universal right angle irons, measuring irons, bench plates, indicators, universal squares, boring equipment for milling machine, etc. The tools are illustrated.

Friction Clutch.—Medart Patent Pulley Co., St. Louis.

Catalog with the title "The Clutch that Clutches." Describes a V-groove friction clutch, built either in solid or split construction. It has an interchangeable extended sleeve upon which can be mounted either a pulley, a gear, sprocket wheel or rope sheave. Numerous applications of the clutch are shown.

Pneumatic Drills and Grinders.—Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago. Leaflet. Illustrates and describes portable drills made in capacities of ¼ in. to 9/16 in., also a portable grinder. The tools can be operated from an electric lamp socket.

Reflectors and Lamp Guards.—Harvey Hubbell, Inc., Bridgeport, Conn. Two folders. One illustrates and describes a line of lamp guards including some provided with lock and key; the other is concerned with reflectors for incandescent lamps.

Wrenches and Pliers.—Lakeside Forge Co., Erie, Pa. Catalog P, 54 pages, 5 x 7½ in. Concerned with drop forged wrenches, adjustable wrenches and pliers. The drop forged wrenches include single and double end wrenches with openings at different angles and 3 wrenches; general purpose, spark plug, structural, construction, track, automobile, tool post and milling machine wrenches; all-around handy wrenches. The pliers are made in sizes of 6, 8 and 10 in.; the adjustable wrenches in sizes from 4¼ in. to 18 in.

Industrial Trucks.—Howe Chain Co., Muskegon, Mich. Catalog 4, with the title "Howe Trucking System." Concerned with trucks for the storage and interdepartment transportation of commodities. The truck consists of a platform equipped with two malleable iron wheels at the rear, and a malleable iron draw bar in front; a second unit is the jack tongue, which when lowered exerts a cam action on the draw bar, elevating the leg off the floor and placing the forward weight of the truck on the jack tongue wheel instead of on the leg. The trucks are made with various types of bodies. The catalog is illustrated.

Balancing Apparatus.—Vibration Specialty Co., Harrison Building, Philadelphia. Booklet. Describes the company's balancing machines, which are used for the study and elimination of vibrations, and illustrates and explains the company's facilities for testing parts such as steam turbine rotors, crankshafts, etc., for balance.

Refractory Brick.—Harrison-Walker Refractories Co., Pittsburgh. Booklet. Concerned with metalkase magnesite brick. The refractory brick, it is stated, is especially adapted for service in open hearth and electric furnaces. The advantages are pointed out and installations in the backwalls, bulkheads and ends of the basic open hearth furnace and the sidewalls of the electric furnace, are shown.

Air Compressors and Pneumatic Tools.—Ingersoll-Rand Co., 11 Broadway, New York. Five bulletins describe with air operated tools, air compressors, etc. Bulletin 1 describes a coal mining machine. Illustrations show machine shearing, over-cutting and under-cutting. Bulletin 8707 is concerned with pneumatic drills, grinders and saws. Various sizes and models of the different machines are illustrated and a detailed description concerning the particular tool to use for a given purpose is included. Tables give the air consumption of the tools. Bulletin 963 describes the various uses for compressed air in the saw mill. Bulletin 945 is a leaflet which shows two of the company's compressors installed in small machine shops, power houses or garages. Bulletin 954 is a folder dealing with the air lift method of pumping.

Space Heaters.—Cutler-Hammer Mfg. Co., Milwaukee. Pamphlet 479, with the title "Miscellaneous Applications of Electrical Heat." Enumerates numerous applications of flat standardized heaters, 2 ft. long, 3/16 in. thick and 1½ in. wide. Methods of mounting and connecting, dimensions, wattages, weight, code numbers and prices are included.

Microscopes.—Bausch & Lomb Optical Co., Rochester, N. Y. Catalog, 110 pages, 6¼ x 10 in. Illustrates and describes an extensive line of microscopes and accessories. New apparatus included are two microscopes, each with revolving stage, binocular microscope with parallel eyepieces and single objective, a binocular microscope stand useful for work with large objects, a camera lucida for the drawing of gross materials, and a centerable condenser for the complete substage.

Industrial Systems.—McCaskey Register Co., Alliance, Ohio. Six Bulletins. Bulletin 1 describes the McCaskey Industrial system and how it applies to various departments of different manufacturing companies; bulletin 2, a perpetual inventory system designed for the Osborn Mfg. Co., Cleveland; bulletin 3, the company's fire resisting cabinet and a system used by the Massillon Rolling Mills Co.; bulletin 5, the uses and advantages of the system which is described as the "One Writing" method; bulletin 6, a tool record system.

Current Metal Prices

On Small Lots, from Merchants' Stocks, New York City

The quotations given below are for small lots, as sold from stores in New York City by merchants carrying stocks.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

Iron and Soft Steel Bars and Shapes

Bars:	Per lb.
Refined iron, base price	4.00c.
Swedish bars, base price	20.00c.

Soft Steel:

¾ to 1½ in., round and square	3.52c. to 3.62c.
1 to 6 in. x ¾ to 1 in.	3.52c. to 3.62c.
1 to 6 in. x ¾ to 5/16	3.62c. to 3.72c.
Rods—¾ and 11/16	3.42c. to 3.67c.
Bands—1½ to 6 x 3/16 to No. 8	4.22c. to 4.32c.

Shapes:

Beams and channels—3 to 15 in.	3.47c.
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Angles:

3 in. x ¾ in. and larger	3.72c. to 3.97c.
3 in. x 3/16 in. and ¾ in.	3.52c. to 3.77c.
1½ to 2½ in. x ¾ in.	3.47c. to 3.72c.
1½ to 2½ in. x 3/16 in. and thicker	3.52c. to 3.77c.
1 to 1½ in. x 3/16 in.	3.52c. to 3.77c.
1 to 1½ in. x ¾ in.	3.57c. to 3.82c.
¾ x ¾ x ¾ in.	3.62c. to 3.87c.
¾ x ¾ in.	3.67c. to 3.92c.
¾ x ¾ in.	4.07c. to 4.72c.
¾ x 3/32 in.	5.17c. to 5.42c.

Tees:

1 x ¾ in.	3.87c. to 4.12c.
1½ in. x 1½ x 3/16 in.	3.77c. to 4.02c.
1½ to 2½ x ¾ in.	3.57c. to 3.82c.
1½ to 2½ x 3/16 in.	3.57c. to 3.82c.
3 in. and larger	3.52c.

Merchant Steel

	Per lb.
Tire, 1½ x ½ in. and larger	3.52c.
Toe calk, ½ x ¾ in. and larger	4.35c.
Open-hearth spring steel	7.00c.
Standard cast steel, base price	14.00c.
Extra cast steel	18.00 to 20.00c.
Special cast steel	23.00 to 25.00c.

Tank Plates—Steel

	Per lb.
¾ in. and heavier	3.67c.

Sheets

Blue Annealed

	Per lb.
No. 10	5.07c. to 5.80c.
No. 12	5.12c. to 5.85c.
No. 14	5.17c. to 5.90c.
No. 16	5.27c. to 6.00c.

Box Annealed—Black

	Soft Steel C. R., One Pass, per lb.	Wood's Refined, per lb.
Nos. 18 to 20	6.05c. to 6.80c.	
Nos. 22 and 24	6.10c. to 6.85c.	7.80c.
No. 26	6.15c. to 6.90c.	7.85c.
No. 28	6.25c. to 8.00c.	8.00c.
No. 30	6.35c. to 7.20c.	
No. 28, 36 in. wide, 10c. higher.		

Galvanized

	Per lb.
No. 14	6.50c. to 8.10c.
No. 16	6.75c. to 8.25c.
Nos. 18 and 20	6.90c. to 8.40c.
Nos. 22 and 24	7.05c. to 8.55c.
No. 26	7.20c. to 8.70c.
No. 27	7.35c. to 8.85c.
No. 28	7.50c. to 10.00c.
No. 30	8.00c. to 9.50c.
No. 28, 36 in. wide, 20c. higher.	

Corrugated Roofing, Galvanized

2½ in. corrugations, 10c. per lb. over flat sheets.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general headings of "Iron and Steel Markets" and "Metal Markets."

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per lb.
Bright basic	7.50c.
Annealed soft	7.50c.
Galvanized annealed	8.00c.
Coppered basic	8.00c.
Tinned soft Bessemer	9.50c.

*Regular extras for lighter gages.

Brass Sheet, Rod, Tube and Wire

BASE PRICE	
High Brass Sheet	27½c. to 28½c.
High Brass Wire	27½c. to 28½c.
Brass Rod	25½c. to 28 c.
Brass Tube	41½c. to 43 c.

Copper Sheets

Sheet copper, hot rolled, 16 oz., 32c. per lb. base.
Cold rolled, 14 oz. and heavier, 1½c. per lb. advance over hot rolled.

Tin Plates

Bright Tin	Grade	Grade	Coke—14x20	Primes	Wasters
	"AAA"	"A"			
	Charcoal	Charcoal	80 lb....	\$9.30	\$9.05
	14x20	14x20	90 lb....	9.40	9.15
			100 lb....	9.50	9.25
IC...	\$15.00	\$13.00	IC...	10.00	9.75
IX...	17.25	15.00	IX...	11.25	11.00
IXX...	19.00	16.75	IXX...	12.25	12.00
IXXX...	20.75	18.50	IXXX...	13.25	13.00
IXXXX...	22.25	20.25	IXXXX...	14.25	14.00

Terne Plates

8-lb. Coating 14x20	
100 lb.	\$9.35
IC	9.50
IX	10.50
Fire door stock	12.75

Tin

Straits pig	56c. to 58c.
Bar	62c. to 65c.
American pig, 99 per cent.	56c. to 58c.

Copper

Lake Ingot	20½c. to 21 c.
Electrolytic	20 c. to 20½c.
Casting	19½c. to 20 c.

Spelter and Sheet Zinc

Western spelter	9¼c. to 10c.
Sheet zinc, No. 9 base, casks	13c.; open 13½c.

Lead and Solder*

American pig lead	7¼c. to 8¼c.
Bar lead	8¼c. to 8½c.
Solder ½ and ½ guaranteed	37c.
No. 1 solder	33c.
Refined solder	28c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	90c.
Commercial grade, per lb.	50c.

Antimony

Asiatic	10c. to 11c.
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Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	35c. to 38c.
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Old Metals

The market is firm. Dealers' buying prices are nominally as follows:

	Cents Per lb.
Copper, heavy and crucible	16.75
Copper, heavy and wire	15.50
Copper, light and bottoms	13.75
Brass, heavy	10.25
Brass, light	7.25
Heavy machine composition	15.50
No. 1 yellow rod brass turnings	9.25
No. 1 red brass or composition turnings	12.50
Lead, heavy	6.00
Lead, tea	4.00
Zinc	5.00

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1.00

9.35
9.50
0.50
2.75

58c.
65c.
58c.

1 c.
1 1/2 c.
1 c.

10c.
3 1/2 c.

8 1/4 c.
8 3/4 c.
.37c.
.33c.
.28c.

ccord-

.90c.
.50c.

b 11c.

b 38c.

are

Cents
per lb.
16.75
15.50
13.75
10.25
7.25
15.50
9.25
12.50
6.00
4.00
5.00